



**Public Works Specifications Ordinance
Jericho, Vermont**

**Adopted by the Jericho Selectboard
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GENERAL SPECIFICATIONS

Introduction

This manual of public works specifications is intended to serve a long established need. Its major usefulness lies in the design and construction of streets, water distribution, sanitary sewers, storm sewers, and related work. These specifications are also supplemented by the Town of Jericho Subdivision Regulations and are considered the minimum acceptable standard specifications for construction within the Town.

These standards are applicable to any new construction and to many aspects of reconstruction necessitated by obsolescence or deterioration involving roads and ancillary infrastructure within the Town of Jericho. Variations from these specifications and details will not be permitted unless supplemental specifications or special provisions are included in the proposed work, and are approved by the Selectboard. In cases where a designed facility is not governed by these specifications and details, the latest design methods shall be used and submitted to the Town for approval. It shall be policy that all engineering design be based on the latest methods and technology when determining sizes, strengths, and amounts. All plans and specifications shall have a note stating, "All work to be performed in accordance with the Town of Jericho Public Works Specifications." All materials, design, and workmanship must meet with nationally accepted standards and practices and, when applicable, those of the State or Town.

Definitions

Town, means the Selectboard, Road Commissioner or Engineer hired by the Town.

Contractor, means the party actually responsible for performing the construction activity.

Developer, means the individual, partnership, corporation or authorized agent developing a parcel or parcels of land and whose name appears on Town applications.

Design/Project Engineer is a Vermont registered professional engineer experienced in the design of streets and appurtenances, sewer and water systems and storm water systems, hired by the developer to perform planning, design and construction related engineering services.

Work Within Town Right-of-Way

Any and all construction within the Town's right-of-way requires an approved Utility Right-of-Way Permit. Applications are available from the Town Administrator or Road Commissioner and are subject to review by the Road Commissioner and final approval by the Selectboard. Adequate notice must be allowed by the Contractor for noted review/approval.

Waiver

The Selectboard may waive or vary, subject to the appropriate conditions, the provisions of any or all requirements of this manual which, in its judgment of the special circumstances of a particular project, are not requisite to the interests of public health, safety, and the general welfare, or which, in its judgment, are inappropriate because of inadequate or a lack of connecting facilities adjacent to or in proximity of the project.

Basic Design Standards

All public and private roads shall have the standard cross-section as shown in the Appendix. In areas where the special cross-section may be appropriate and prior to submittal of preliminary drawings for the construction of new roads or the reconstruction of

existing roads, soil borings and/or test pits shall be made by the developer at his expense, to a depth of 6' below final road grade surface on the basis of at least one representative test every 250' and at every change in soil type. The highest seasonal groundwater level shall be recorded. Soil tests shall be performed by a soils laboratory acceptable to the Town on samples taken and the tests shall consist of:

1. Standard sieve analysis and grain size distribution curve for each representative soil in the cross section.
2. Plasticity index and liquid limit for each representative soil in the cross section.

The Selectboard may waive the necessity for soil borings or modify the requirements, depending on the specific ground water and soil characteristics at each location.

ROAD DESIGN STANDARDS	
Residential	
Maximum Street Grade	10%
Minimum Bituminous Pavement Width (non-curbed)	22'
Minimum Bituminous Pavement Width (curbed)	24'
Commercial	
Maximum Street Grade	8%
Minimum Bituminous Pavement Width (non-curbed)	22'
Minimum Bituminous Pavement Width (curbed)	24'

The Town of Jericho Subdivision Regulations establishes three types of streets – the minor street, the collector street and the major street. A minor street is defined as one that is primarily intended to carry traffic to abutting properties. It may be either private or public. A collector street carries traffic from a minor street to a major street and a major street is used as a link between communities or different portions of Town. A major street generally has an ADT of at least 800 vehicles per day. All collector and major streets will be public. It is anticipated that most new roads constructed in Jericho will fall into the category of minor streets.

The minimum width of right-of-way width for new streets shall be not less than 60'.

Street grades should generally not exceed 8% unless circumstances require. If topography demands, residential streets may be constructed up to 10%. The minimum grade shall not be less than 0.5%. The maximum grades within 100' of intersection centerlines shall not be greater than 3%.

The width of the bituminous concrete wearing surface of any street may not be less than 22' for uncurbed streets and 24' for curbed streets. Uncurbed streets shall include 2' shoulders. The cul-de-sac on a dead end street shall have a minimum diameter of right-of-way of 120'. Cul-de-sacs shall have a minimum outside diameter of pavement of 90'. Hammerheads, with 50' extensions, are an acceptable option, subject to Selectboard approval.

The minimum curve radius for minor streets will be 150'. The minimum radius for collector streets will be 250'. Major streets will be reviewed on a case-by-case basis. Any change in direction of a street centerline will require a horizontal curve.

Street corners shall have a minimum curb or edge of pavement radius of not less than 20'. Commercial or industrial streets or drives shall have a minimum curb or edge of pavement radius of not less than 30'. The grade for any portion of a driveway within the town right-of-way shall be -3%. (All drives must slope away from the road)

Every change in grade shall be connected by a vertical curve constructed so as to afford a minimum sight distance of 150' for minor streets and 250' for collectors. Major streets will be reviewed individually.

A tangent of at least 100' in length for collector streets shall be introduced between reverse curves on all proposed streets.

Street jogs with centerline offsets of less than 150' for minor streets and 250' for collector streets will not be allowed. Major streets will be reviewed individually.

Where the subdivision borders on an existing road or an abutting developable parcel of land and when the Town determines that a realignment or widening of the road or a future road right-of-way would be in the public interest, the Town may require that such areas be shown and marked on the Plat "Reserved for Road Alignment and/or Widening Purposes or Future Road." Areas shown in this manner shall be dedicated to the Town. Such land may not be counted in satisfying minimum requirements set forth in the Zoning Ordinance.

No street shall be approved unless its elevation is above the elevation of the historic flood of record.

Side slopes of street embankments shall descend no steeper than 1' vertically for 3' horizontally (1 on 3) where possible and 1 on 2 where required by severe topographic conditions. Slopes in rock excavation shall ascend no more steeply than 4' vertically for each 1' horizontally (4 on 1). Where rock cuts have a face higher than 10' vertically, a 3' bench shall be provided at each 10' level above the grade at the edge of the pavement. Side slopes shall not be graded so as to extend beyond the limits of the road right-of-way onto land not part of the subdivision unless a suitable slope easement has been properly established and granted by the affected property owner.

Poles, brackets, and lights for street lighting are to be approved as to size, type, and location by the Selectboard. They shall be complete and fully energized.

Private driveways shall have a maximum grade of 15%, a minimum width of 12', and be capable of supporting the weight of a two-axle, 40,000 pound vehicle. For any new subdivision with a shared driveway over 100' serving up to 3 lots, the maximum grade shall be 15%; the driveway shall have at least a 15' wide improved travel way, or shall, at intervals of 100' of length, have other provisions for the passing of oncoming vehicles; shall be capable of supporting the weight of a two-axle, 40,000 pound vehicle; and shall have an adequate turnaround at the end. The grade for any portion of a driveway within the Town right-of-way shall be -3%. (All drives must slope away from the road.) [See also the detailed requirements of "Access Standards" on Town of Jericho Road Access Permit Application] Curb cuts will be limited to one per residential property.

Guardrails shall be Core 10 steel beam with wood or steel posts, meeting the current VAOT specifications. In general, guardrails are required when the fill height, as measured from the roadway shoulder, exceeds 10' and the fill section slope is steeper than one foot vertical to three feet horizontally. Guardrails for fixed object hazards such as retaining walls, trees, or culverts shall be evaluated on an individual basis.

Private roads shall be developed to the same standards as public roads.

All new public streets will be paved. The Town may require sidewalks or multi-use pathways on residential and collector streets which shall conform to the requirements found in this manual. Private streets may either be paved or unpaved, as determined during the Town approval process.

Project Letter of Credit or Cash Escrow

Compliance with the performance bond requirements of Article IV, Section 4 of the Jericho Subdivision Regulations and Section 4418 of Title 24 VSA, requires the posting of a performance bond with a commercial surety, a bank letter of credit, or a cash escrow deposit, in an amount sufficient to cover the full cost of completion of all public improvements required by the Development Review Board and the Selectboard, prior to the issuance of any building permit. The commercial surety, bank, or other institution must be acceptable to the Selectboard. In the case of road plans approved by the Board, such performance security shall include a maintenance period of two years following the final inspection and approval of the road by the Town. The amount held as security for the maintenance period shall be determined by the Selectboard. Acceptance of the bond, letter of credit, or cash escrow, is subject to an approved Escrow Agreement.

Protection/Supervision of Work Personnel and the Public; Signage

The Contractor's employees and the public shall be protected by the Contractor from any and all hazards connected with the construction work. Open trenches, materials, or equipment within the working limits are to be guarded by the use of adequate barricades or flaggers. All barricades left in position overnight are to be properly lighted. Kerosene pots are not acceptable. When work narrows the useable pavement, flaggers shall be employed to aid the flow of traffic so that there will be no undue delays. The Contractor shall be held responsible for the safety of all workers and the general public and all damages to property occurring from or upon the work occasioned by negligence or otherwise growing out of a failure on the part of the Contractor to protect persons or property from hazard of open trenches, materials or equipment at any time of the day or night within the working area. All work shall be in conformance with applicable OSHA and VOSHA regulations.

Construction approach signs shall appear at each end of the highway under construction and on all intersecting public highways. The location, number, size, and type of signs shall conform to the current VAOT specifications for construction signing. The exact placement of any sign will depend upon the alignment of the highway and the character of the roadsides. The proposed location, measurements, and minimum spacing shall be reviewed by the Road Commissioner. The design of the signs shall conform with the standards prescribed in the Manual on Uniform Traffic Control Devices prepared by the National Joint Committee on Uniform Traffic Control Devices. The signs shall be of metal, wood, plywood, hardboard, or any other material satisfactory to the Road Commissioner. No material shall be approved that will deteriorate by exposure to the weather during the required life of the sign.

All new signs requiring an orange background shall have encapsulated lens reflective sheeting material. The signs shall be in place at the time the project officially commences. Each sign shall be erected on wood or metal posts set securely in the ground, in a neat and professional manner.

The bottom of a sign shall be at least 6' outside the shoulder point or 2' outside the guardrail, curbing, or sidewalk. Posts and signs shall be braced or reinforced in the back as necessary. The installation and maintenance of signs shall be subject to the approval of the Road Commissioner. Signs may be mounted on a portable support when approved by the Road Commissioner. Signs shall be maintained in a clean and legible condition, they shall be completely visible to approaching traffic at all times, and they shall be kept plumb and level.

Traffic Studies

A complete traffic study, as described below, may be required for all commercial developments and/or expansions, and for any residential project with 20 or more living units. Because each project is unique, the Town reserves the right to apply these guidelines as conditions demand. All projects regardless of type or size will require a sight distance and safety analysis.

1. The scope of the study shall include the impacts of the project on driveways and intersections, adjacent signalized and unsignalized intersections, and other locations as stipulated by the Development Review Board.
2. The analysis periods shall be:
 - a. Base Year – time of project or major phase completion
 - b. Planning Year
 - if the project is fully completed in the base year, base year plus five years
 - if the project is not fully completed in the base year, base year plus five years or year of completion, whichever is longer
3. Study content:
 - a. Listings of project development characteristics, trip generation rates, and related travel patterns
 - b. Tabular summaries of existing, development, and combined vehicular volumes for the analysis periods
 - c. Documented warrant evaluations for
 - 1) geometric needs including, but not limited to, right-turn lanes, left-turn lanes, radii, etc., in terms of 30th highest hour volumes.
 - 2) signal needs in terms of average weekday volumes.
 - d. Traffic performance evaluations for all study locations in terms of 30th highest hour volumes for the selected analysis periods.
 - 1) Numerical measures of capacity
 - 2) Level of service descriptions, delay and gap calculations
 - e. Study of proposed driveway(s) features
 - 1) Sight distances
 - 2) Non-interfering approach speeds on the intersecting street or road
 - 3) Acceptable spacings with respect to adjacent intersections and/or major driveways

- 4) Recommend driveway configuration in terms of number and use of lanes, lane widths, and edge of pavement designs
- f. Safety evaluation on main roadway or intersection at project driveway(s)
 - 1) Summary of accident characteristics for the past five years by cause, type, and severity
 - 2) Comparison of actual and critical accident rates (Roadway: per 1,000,000 vehicle miles; Intersection: per 1,000,000 incoming vehicles)
 - 3) Recommend improvements for any accident prone locations
 - 4) Evaluation of existing geometrics and alignment with respect to both vehicles and pedestrian safety and level of service.
4. Summary of any recommended geometric and/or control improvements to provide proper traffic performance and safety.
5. Miscellaneous items as requested by the Development Review Board or Selectboard, i.e., facilities for pedestrians, bicyclists, and/or handicapped accessibility; evaluation of internal circulation, parking requirements.
6. Any roadway improvements necessary as a result of the project access and impact shall be paid for, and constructed by, the developer.

Protection, Repair and Reconstruction of Existing Utilities

The Contractor shall notify Dig-Safe prior to any excavation in the public right-of-way or utility easement limits. Wherever existing facilities/structures of any type are encountered, they shall be protected and firmly supported by the Contractor at his own expense, by methods approved by the authority having control of the above or below ground structure, until excavation is back-filled and the existing structures are made secure. Damage to any such structure caused by or resulting from the Contractor's operations, shall be repaired at the Contractor's expense within a time period that will not place an unreasonable burden on the users. The authority having charge of any particular underground structure shall be notified promptly of damage to its structure.

In the case where it shall be necessary to remove or reconstruct any facility/structure, approval for relocation shall be obtained from the appropriate party prior to relocation/removal. The Contractor shall be responsible for the work and for providing notice to users before interrupting service. Unless specifically provided for by written agreement, reconstruction of the utilities shall be at the Contractor's expense. In no case shall the Contractor move, change or repair any facility without the permission of the Town and the utility owner, and until they are satisfied that adequate warning to the users has been provided.

The employment or presence of traffic flaggers or uniformed police does not relieve the Contractor of responsibility or liability.

Road/Utility Systems Inspection Requirements

At the Developer's expense, inspections will be made by the Town's engineer and/or the Road Commissioner at various stages of construction:

- Preparation of subgrade
- Installation of subbase material
- Completion of final grading
- During placement of base coat of asphalt
- During and after placement of top coat of asphalt

No backfilling of trenches shall occur until the installation of pipelines and structures has been inspected and approved by the Town.

Inspections shall be scheduled with at least 48 hours notice to the Town.

Submittal of Record Drawings

Complete record drawings in paper format shall be produced for all construction projects and shall include the following information.

Roads:

- Accurate locations and elevations of all streets and storm drain lines, culverts, and other facilities including:
 - width of pavement between shoulders or curbs
 - right of way dimensions for streets
 - width of sidewalk and bikeways
 - location of street lights
 - location of driveways
 - typical cross-section of streets as installed
- Location of electric and telephone lines, structures and poles, street monuments

Water:

- Accurate locations of all water lines
- Measurement to within ½' from all valves and curb stops, from permanent fixtures such as telephone poles, hydrants, buildings, transformers, etc., along with depths of waterlines. Three point minimum tie measurements are required.
- All curb boxes will be marked with stakes or PVC pipe so contractors can easily locate them before building services are connected.

Sewer:

- Accurate locations of all sewer lines and clean-outs
- Accurate measurements to all tees and/or wyes for building connections (shown on tie drawings)
- Location of building connections at property line and depth and location of all manholes (shown on tie drawings)
- Invert and manhole cover elevations, distances between manholes, size of pipe in manholes and slope of pipe

Storm Drainage:

- Depth, size, location and type of all storm drain lines and culverts, including underdrains and services
- Location and elevations of all catch basins
- Location and details for all storm drainage facilities such as detention ponds
- Location of all drainage ways, water courses, etc.

After the initial set of record drawings have been submitted, there will be an inspection by the Town to verify that the hydrant, valve boxes, curb boxes, etc., are properly raised to ground level.

Prior to final construction approval of the project by the Town, a final set of record drawings shall be submitted to the Town within 60 days of the completion of a project or project phase. The final set shall be stamped by the Design/Project Engineer and shall also contain a signed statement by a licensed Land Surveyor that all property corner markers have been set in accordance with the approved property plat.

In addition to the paper set of plans, all plats, site plans and other plan view drawings shall be provided to the Town in a GIS format which is compatible with the Town GIS data base.

Special Controls

The Contractor shall be responsible at his own expense for ensuring that the dust created as a result of construction activities does not create a nuisance or safety hazard. Where and when deemed necessary by the Town, the Contractor will be required to wet sections of the construction area with water, or apply calcium chloride, or sweep the roadway with a wetted power broom as dust control measures.

The Contractor shall take all necessary measures to handle all water in excavations, utilizing a method of his choice and taking full responsibility for its adequacy. He shall furnish all materials and equipment, and do all incidental work to keep the excavation clear of water while pipelines, structures, and their foundations are being built. No construction shall be undertaken if, in the opinion of the Town, adequate control of water is not assured.

During the construction period, the Contractor shall exercise every reasonable precaution to prevent pollution of the waters of the State. Applicable statutes and regulations of the Vermont State Agency of Natural Resources relating to the prevention and abatement of pollution shall be complied with.

Development or construction plans shall include detailed information on the proposed methods for erosion control and will be subject to the Town's approval and continued oversight. The erosion control plan shall conform to the requirements in the State of Vermont Erosion Control Handbook. The Contractor shall perform all of the storm water and erosion control specifications and details shown on the approved plans including installation, maintenance and removal of temporary dams and inlet protection.

Miscellaneous Requirements

Street Names: Per the Town's E911 Ordinance, all names shall be submitted to the E911 Coordinator for initial approval, then forwarded to the Selectboard for final approval.

Street Signs: The Developer is responsible for the expense incurred by the Town to purchase and install a new street name sign, whether or not the street is public.

STREETS

(See Details: Figures 1-12)

Excavation

Sufficient topsoil shall be stripped from the areas to be filled or excavated to provide a minimum of 4" of cover over all finished slopes. This material shall be stored in stockpiles on the site until completion of grading operations and then shall be spread uniformly over all finished slopes.

All excavating and filling required for construction of pavements, curbs, gutters, headwalls, drainage structures, and installation of pipe drains shall be as specified herein and shown on the construction standards. The entire area of work shall be brought to the required lines and grades by excavation or filling. Excavated material, if suitable, shall be used in making embankments, in filling the low areas of work, and at such places as may be required.

All earthwork shall be performed in accordance with Division 200 of the Vermont Standard Specifications for Construction. In areas of ledge excavation, all ledge shall be removed to subgrade and shall be shattered to a level 2.5' below subgrade.

Embankments

Embankments shall be constructed by the Contractor with either approved surplus excavated material or with approved material obtained elsewhere.

The construction area shall be cleared of trees, brush, bushes, and shrubs, and shall be grubbed to remove all stumps, roots, duff, grass turf, debris, or other objectionable material. All material resulting from clearing and grubbing shall be satisfactorily disposed of in a manner approved by the Town and in compliance with local ordinances. Under no conditions will this material be buried below the seasonal high groundwater.

When embankments are to be made on a hillside, the slope of the original ground on which the embankments are to be constructed shall be stepped and properly drained as the fill is constructed so that adverse movements of the slopes do not occur.

The excavated rock, ledge, boulders, and stone, except where required in the construction of other items or otherwise directed, shall be used in the construction of embankments to the extent of the project requirements and generally shall be placed to form the base of an embankment.

Frozen material shall not be used in the construction of embankments, nor shall embankments be placed upon frozen material. Placement of material other than rock shall stop when the sustained air temperature, below 32 degrees Fahrenheit, prohibits obtaining the required compaction. If the material is otherwise acceptable, it shall be stockpiled and reserved for future use when its condition is acceptable for use in embankments.

When an embankment is to be constructed across a swamp, muck, or areas of unstable soils, the unsuitable material shall be excavated to reach soils of adequate bearing capacity and the embankment begun. Alternative methods, such as use of a geo-textile in place of excavation and backfill, may be utilized only after approval of the same by the Town.

Material being placed in embankments shall be placed in horizontal layers of uniform thickness across the full width of the embankment. Stumps, trees, rubbish, and other unsuitable material shall not be placed in embankments.

The layers shall begin at the deepest part of the fill. Material shall be placed in six-inch lifts with a 95 percent maximum dry density by the AASHTO-T-99, Method A (Standard Proctor) test. Effective spreading equipment shall be used on each layer to obtain uniform thickness prior to compaction. Each layer shall be kept crowned to shed water to the outside edge of the embankment and continuous leveling and manipulating will be required to assure uniform density. The entire area of each layer shall be uniformly

compacted to at least the required minimum density by use of compaction equipment consisting of rollers, compactors, or a combination thereof. Earthmoving and other equipment not specifically manufactured for compaction purposes will not be considered as compaction equipment.

All fill material shall be compacted at a moisture content suitable for obtaining the required density. In no case shall the moisture content in each layer under construction be more than 3 percent above the optimum moisture content and shall be less than that quantity that will cause the embankment to become unstable during compaction. Sponginess, shoving, or other displacement under heavy equipment shall be considered prima facie evidence for an engineering determination of lack of stability under this requirement, and further placement of material in the area affected shall be stopped or retarded to allow the material to stabilize.

When the moisture content of the material in the layer under construction is less than the amount necessary to obtain satisfactory compaction by mechanical compaction methods, water shall be added by pressure distributors or other approved equipment. Water may also be added in excavation or borrow pits. The water shall be uniformly and thoroughly incorporated into the soil by disc harrowing, blading, or by other approved methods. This manipulation may be omitted for sands and gravel. When the moisture content of the material is more than 3 percent above the optimum moisture content, dry material shall be thoroughly incorporated into the wet material, or the wet material shall be aerated by disking, harrowing, blading, rotary mixing, or by other approved methods; or compaction of the layer of wet material shall be deferred until the layer has dried to the required moisture content.

Upon the completion of filling and excavation, the subgrade shall be formed to the required grade and contour, and the entire surface again rolled as specified above. High spots shall be removed and low spots filled with acceptable material, and the process of leveling and rolling continued until no further depression results. Approval of the Town shall be necessary prior to placing of gravel subbase.

Geo-Textiles

Where required on the plans or where directed by the Town, the Contractor shall install geo-textile, such as Mirafi 500X (over roadway subgrades) or 140N (in drainage trenches) as manufactured by Celanese Corporation, or TYPAR as manufactured by DuPont Corporation, or an approved equal.

Prior to placement of the geo-textile, the surface shall be smoothed to remove all objectionable material that could damage the fabric. Where more than one width of geo-textile must be employed, the edges shall be overlapped approximately 3' and shall be fastened with 6" U-shaped wire pins, single-shaft steel pins with metal-disc fasteners, or similar devices. Fasteners shall be placed 6' apart on the overlap. Where utilized in underdrains, channels, or streams, the geo-textile shall be overlapped in the direction of water flow. Toeing may be required to ensure that the fabric is secured by placing a four-inch bedding-blanket of gravel over the filter fabric so as not to damage the fabric.

Underdrains

DESCRIPTION: This item shall consist of constructing underdrains using pipe, stone, geo-textile, underdrain outlets, clean outs, and risers in accordance with these specifications and as shown on the approved drawings or as ordered by the Town.

MATERIALS:

Perforated High Density Polyethylene Pipe (HDPE) – shall conform to ASTM F405.

Perforated Polyvinyl Chloride (PVC) - shall conform to ASTM D-2729 or AASHTO M278.

Perforated Corrugated Steel Pipe - shall conform to AASHTO M36. Minimum sheet metal thickness required is 0.052 inch for 6" underdrain and 0.064 inch for 8" or larger.

Perforated Corrugated Aluminum Alloy Pipe - shall conform to AASHTO M196.

Stone - shall be clean, durable 3/4" – 1-1/2" stone.

Geo-Textile - shall be Mirafi 140N or equal.

CONSTRUCTION METHODS: Trenches for underdrain shall be excavated to the dimensions and grades shown on the plans or as ordered by the Town. Stone fill shall be placed to a depth of 6" below the bottom of the pipe in conformity with the lines and grades shown on the plans or as directed by the Town. Underdrain shall be placed in the center of the trench and firmly embedded in the material. The underdrain trench shall be backfilled to the gravel road base with 3/4" to 1-1/2" clean stone. Placing shall begin at the outlet end and proceed toward the uphill end. The underdrain shall be placed with perforations down.

The joints between sections shall be made by fitting the ends as tightly as practicable. Corrugated steel or aluminum alloy underdrain shall be joined with an approved coupling. Plastic underdrain shall be suitably joined with approved fittings by the manufacturer of the pipe.

Upgrade ends of all underdrain pipe installations shall be the length shown on the plans, and cast iron covers shall be installed at locations shown on the plans closed with suitable plugs to prevent entry of soil material. Underdrain cleanouts, of the length shown on the plans, and cast iron covers, shall be installed at locations shown on the plans or as directed by the Town. Solid pipes used in an underdrain system placed at road crossings, outlets, or as directed by the Town shall be placed on a firm bed and joined in the same manner as underdrain.

Backfill material shall not be placed directly in the trench by dumping from haul vehicles or by pushing material into trenches with bulldozers, graders, or other equipment. Placing shall be limited to the use of hand shovels, backhoes, front-end loaders, or other similar types of equipment.

Geo-textile shall be placed in the trench around the stone fill with a 6" fabric overlap at the top. (See underdrain detail.)

Subgrade

The subbase material shall be placed on a prepared surface with an approved spreader box or by use of some other approved mechanical spreading equipment. The material shall be deposited so as to meet the requirements of the Vermont Standard Specifications for Construction, Section 301, and compacted to a 95 percent dry density by the AASHTO-T-99 Method A (Standard Proctor) test.

Sand

DESCRIPTION: This item shall consist of a subbase course of sand approved by the Town and constructed on a prepared subgrade in accordance with the sections as shown on the accepted drawings. In some cases, sand may also be used as pipe bedding or as backfill for trenches or structures.

MATERIALS: Sand shall consist of material free from silt, loam, clay, or organic matter. It shall conform to the Vermont Standard Specifications for Construction for sand borrow, #703.03. It shall be obtained from approved sources and shall meet the requirements set forth in this table:

Sieve Designation	Percentage By Weight Passing Square Mesh Sieve
2"	100
1 ½"	90-100
½"	70-100
No. 4	60-100
No. 100	0-20
No. 200	0-6

Gravel Subbase

BASE COURSE

DESCRIPTION: This item shall consist of a subbase course composed of bank run gravel as approved by the Town and constructed on a prepared subgrade in accordance with the sections as shown on the approved drawings.

MATERIALS: All materials shall be secured from approved sources. Such gravel shall consist of hard, durable stones, which show uniform resistance to abrasion and which are intermixed with sand or other approved binding material as directed by the Town. It shall meet the requirements of Vermont Standard Specification for Construction, #704.04 Gravel for Subbase. The gravel shall be uniformly graded from coarse to fine and shall meet the grading requirements set forth in this table:

Sieve Designation	Percentage By Weight Passing Square Mesh Sieve	
	<u>Total Sample</u>	<u>Sand Portion</u>
No. 4	20 - 60	100
No. 100		0-12
No. 200		0-6

All subbase course material shall be deposited and spread to distribute the material in uniform layers; it shall be compacted at optimum moisture content; and the maximum size stone particles shall not exceed two-thirds (2/3) of the thickness of the layer being placed.

CRUSHED GRAVEL SUBBASE

DESCRIPTION: This item shall consist of a subbase course of crusher run gravel in accordance with these specifications. This subbase course shall conform to the following specifications and be placed in accordance with the lines, grades, and typical cross-sections as shown in the approved drawings. Material shall meet Vermont Standard Specifications for Construction, Item # 704.05, Crushed Gravel for Subbase.

MATERIALS: All materials shall be secured from approved sources. This gravel shall consist of angular and round fragments of hard durable rock of uniform quality throughout, reasonably free from thin elongated pieces, soft or disintegrated stone, dirt, or other objectionable matter. The grading requirements shall conform to the following table:

Sieve Designation	Percentage By Weight Passing Square Mesh Sieve
2"	100
1 1/2"	90-100
No. 4	30-60
No. 100	0-12
No. 200	0-6

This subbase course of crusher run gravel shall be deposited and spread in a uniform layer and compacted to a 95 percent dry density by the AASHTO-T-99 Method A (Standard Proctor) test.

Bituminous Concrete Pavement

DESCRIPTION: This type of pavement shall be composed of mineral aggregate, mineral filler, if required, and bituminous material, plant mixed and laid hot. This pavement shall be constructed as two courses on the prepared or existing base in accordance with these specifications and in conformity with the lines, grades, thickness, and typical cross-sections shown on the approved drawings. The base and wearing courses shall be 1 ¾" (footnote) and 1 ¼" respectively for a total thickness of 3" for minor roads and 2 ½" and 1 ½" respectively, for a total thickness of 4" for collector roads and commercial roads. Unless otherwise approved, the base course shall be Type 2 bituminous concrete and the wearing course shall be Type 3.

MATERIALS: The course aggregate shall consist of clean, hard crushed rock or screened crushed gravel free from dirt or foreign matter. It shall be reasonably free from soft and elongated pieces.

The fine mineral aggregate shall consist of sand or a mixture of sand and stone screenings of which at least 50% by weight shall be sand. The sand shall consist of clean, hard, durable grains, free from injurious amounts of vegetable matter or other harmful substances.

The asphalt cement shall conform to all the requirements as set forth in Section 702 and 704.10 of the Vermont Standard Specifications for Construction.

CONSTRUCTION METHODS: Equipment for spreading and finishing the mixture shall be a mechanical spreading and finishing machine provided with an activated screed and heated if required. The machine shall be capable of spreading the mixture without segregation and shall be approved by the Town before being used.

Application of bituminous concrete pavement shall meet all the requirements of the Vermont Standard Specifications for Construction, Section 406, including but not limited to, the following:

- **Weather Limitations:** Bituminous material shall not be placed between November 1st and May 1st, unless approved by the Town. Material shall not be placed when the air temperature at the paving site in the shade and away from artificial heat is 40 degrees Fahrenheit or below.
- **Conditioning:** Prior to placing the bituminous wearing course, the existing base course shall be cleaned, and then sprayed with a coat of emulsified asphalt, if the

¹thicknesses not consistent with fig. 1&2

time since the placement of the base course has exceeded 30 days or if the base course has been contaminated with dirt. No wearing course shall be placed upon a wet base course.

- **Compaction:** Immediately after the bituminous mixture has been spread, struck off, and surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling. Along forms, curbs, headers, walls, and other places not accessible to the rollers, the mixture shall be thoroughly compacted with hot or lightly oiled hand tampers, smoothing irons, or mechanical tampers. On depressed areas, a trench roller may be used, or cleated compression strips may be used under the roller to transmit compression to the depressed area.
- **Surface Tolerances:** The surface will be tested by the Town using a 16' straightedge at selected locations parallel with the centerline. Any variations exceeding 3/16 of an inch between any two contacts shall be satisfactorily eliminated. A 10' straightedge may be used on a vertical curve. The straightedges shall be provided by the Contractor.
- **Matching Surfaces:** When new pavement is to match an existing bituminous pavement for a roadway or trench, the Contractor shall vertically smooth cut the existing pavement along a straight line a minimum of 1' into the existing pavement, over the existing gravel base. The smooth cut shall be thoroughly cleaned and coated with emulsified asphalt, just prior to paving.

Cement Concrete Curb

DESCRIPTION: This item shall consist of a Portland cement concrete curb constructed on a prepared subgrade in accordance with these specifications and the cross section shown on the drawings.

MATERIALS: All concrete used in the construction of roadway curbs shall be air entrained not less than 5 percent nor more than 7 percent, so determined by an air meter approved by the Town. This concrete shall have a 28-day compressive strength of 3500 psi and shall meet Section 501 of the State of Vermont Standard Specifications for Construction for Class B concrete.

CONSTRUCTION METHODS:

- **Preparation of subgrade** – All boulders, organic material, soft clay, spongy material, and any other objectionable material shall be removed and replaced with approved material. The concrete curbing shall be built to the required line and grade on a bed of gravel a minimum of 12" in depth which shall be fully compacted.
- **Forms for concrete** – The forms shall be of metal or of acceptable planed and matched lumber and of such construction that a smooth surface will be produced. All forms shall be oiled.
- **Placing and finishing concrete** – Just prior to placing the concrete, the subgrade shall be moistened. The concrete, mixed to the proper consistency, shall be placed in the forms and thoroughly tamped in place so that all honeycombs will be eliminated and sufficient mortar will be brought to the surface. The use of vibrators or other compaction equipment to move the concrete within the forms is not approved. Immediately upon removal of the forms, the curbing shall be

rubbed down to a smooth and uniform finish. No plastering or patching will be allowed. After the forms have been removed, the trench shall be backfilled with approved gravel and fill as needed and thoroughly tamped, care being taken not to affect the alignment or grade of the curbing.

- Expansion and contraction joints – 1/2" expansion joints shall be placed at intervals of 20 feet. At intervals not greater than 10 feet, nor less than 5 feet, the concrete curbs shall be scored for a depth equal to one-third the total depth of the concrete.
- Curing the concrete – When completed, the concrete shall be kept moist for a period of not less than 3 days and longer if the Town deems necessary and shall be protected from the elements in an approved manner. If the Contractor elects, he may apply an approved curing compound according to directions of the manufacturer.
- Seasonal limits – No concrete shall be poured on a frozen or thawing subgrade, during unseasonable weather conditions, or when the temperature is 38 degrees Fahrenheit and falling. The Contractor shall record the temperature daily as outlined in Proposed Recommended Practice for Cold Weather Concreting, ASI 306. In hot weather, temperature of freshly placed concrete shall not be allowed to exceed 85 degrees Fahrenheit, conforming to ACI 305.
- Anti-Spalling Compound – When the initial curing period is over (approximately 28 days after placement), all exposed surfaces shall receive 2 coats of anti-spalling compound. The surfaces shall be cleaned, and then the compound shall be applied; the first coat at a rate of .025 gallons per square yard and the second at a rate of .015 gallons per square yard. Anti-spalling compound shall only be applied when the air temperature is above 50 degrees Fahrenheit.
- Curb cuts – Each house shall be allowed one curb cut. The Owner/Developer must obtain a Curb Cut Permit Application from the Town and meet with the Road Commissioner before final approval by the Selectboard.

Cement Concrete Sidewalk or Multi-use Path

DESCRIPTION: This item shall consist of sidewalk or multi-use path made of one course of Portland cement concrete not less than 4" thick and with a width of not less than 5' (8' for multi-use). Where the sidewalk or path crosses a driveway, the depth of concrete shall not be less than 6" for residential driveways and 8" for commercial and industrial driveways for the full width of the driveways. The sidewalk shall be constructed in accordance with these specifications and the cross sections as shown on the approved drawings.

MATERIALS: Same as for Cement Concrete Curb.

CONSTRUCTION METHODS: Preparation of subgrade - All boulders, organic material, soft clay, spongy material, and any other objectionable material shall be removed and replaced with approved material. The subgrade shall be properly shaped, rolled, and uniformly compacted to conform with the accepted cross sections and grades.

- Base - A minimum depth of 12" of compacted crusher run gravel shall be constructed on the subgrade to accepted cross sections and grades.

- Forms for concrete - The forms for the concrete shall be of wood or metal, well oiled, straight, free from warps or kinks, and of sufficient strength. They shall be staked securely enough to resist the pressure of the concrete without spring. When ready for the concrete to be deposited, they shall not vary from the approved line and grade and shall be kept so until the concrete has set.
- Placing and finishing concrete - Just prior to placing the concrete, the subgrade shall be moistened. The concrete mixed to the proper consistency shall be placed in the forms and thoroughly tamped in place so that all honeycombs will be eliminated and sufficient mortar will be brought to the surface. After this, the surface shall be brought to a smooth even finish by means of a float. The surface shall be broom finished. All faces adjacent to the forms shall be spaded so that after the forms are stripped the surface of the faces will be smooth, even, and free of honeycombs. All edges shall be tool rounded with an edge having a 1/4" radius.
- Expansion joints and scoring concrete – 1/2" transverse expansion joints shall be placed at intervals not exceeding 20'. Sidewalks shall be scored to a depth of 1" every 5".
- Curing concrete – Same as for Cement Concrete Curb.
- Backfilling – Backfill shall be of suitable crusher run gravel and shall be placed and tamped until firm and solid. Backfilling shall follow immediately after the concrete forms have been removed.
- Seasonal limits – Same as for Cement Concrete Curb.

Bituminous Concrete Multi-use Paths:

DESCRIPTION: this item shall consist of multi-use paths, where required or approved by the Town, constructed of one course of bituminous concrete not less than 2" thick and 8' wide. Paths shall be constructed in accordance with these specifications and the lines, grades and typical cross sections shown on the approved drawings. Unless otherwise approved, bituminous concrete shall be Type 3.

MATERIALS: Same as for Bituminous Concrete Pavement

CONSTRUCTION METHODS: Equipment for spreading and finishing the mixture shall be a mechanical spreading and finishing machine provided with an activated screed and heated if required. The machine shall be capable of spreading the mixture without segregation and shall be approved by the Town before being used.

Application of bituminous concrete pavement shall meet all the requirements of the Vermont Standard Specifications for Construction, Section 406, including but not limited to, the following:

- Weather Limitations: Bituminous material shall not be placed between November 1st and May 1st, unless approved by the Town. Material shall not be placed when the air temperature at the paving site in the shade and away from artificial heat is 40 degrees Fahrenheit or below.
- Subbase: There shall be a minimum of 12" of thoroughly compacted crushed gravel subbase.

- **Compaction:** Immediately after the bituminous mixture has been spread, struck off, and surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling. Along forms, curbs, headers, walls, and other places not accessible to the rollers, the mixture shall be thoroughly compacted with hot or lightly oiled hand tampers, smoothing irons, or mechanical tampers.
- **Surface Tolerances:** The surface will be tested by the Town using a 16' straightedge at selected locations parallel with the centerline. Any variations exceeding 3/16 of an inch between any two contacts shall be satisfactorily eliminated. A 10' straightedge may be used on a vertical curve. The straightedges shall be provided by the Contractor.

Cement Concrete Driveway Aprons

DESCRIPTION: This item shall consist of a Portland Cement Concrete driveway apron not less than 6" thick to be constructed on a prepared subgrade in accordance with these specifications and as shown on the approved drawings.

MATERIALS: Same as for Cement Concrete Curb.

CONSTRUCTION METHODS:

- Preparation of subgrade - Same as for Cement Concrete Sidewalk.
- Forms for concrete - Same as for Cement Concrete Sidewalk.
- Placing and finishing concrete - Same as for Cement Concrete Sidewalk.
- Expansion joints - 1/2" transverse expansion joints shall be placed where the driveway apron and driveway joins the sidewalk and curb or pavement.
- Curb - Curbs shall be constructed so as to protrude 1-1/2" above the roadway surface at the entrance to the driveway. This curb shall be constructed with a smooth and gradual depression transition, which shall not exceed 9" in length.
- Curing concrete - Same as for Cement Concrete Sidewalk.
- Seasonal limits - Same as for Cement Concrete Sidewalk

Bituminous Concrete Driveway Aprons

DESCRIPTION: This item shall consist of a Bituminous Concrete driveway apron not less than 2" thick to be constructed on a prepared subgrade in accordance with these specifications and as shown on the approved drawings.

MATERIALS: Same as for Bituminous Concrete Pavement.

CONSTRUCTION METHODS:

- Subbase - A minimum depth of 12" of compacted, crusher run gravel shall be constructed on the subgrade to accepted cross sections and grades.
- Curbs - Same as for Cement Concrete Driveway Aprons.

Street Sideline Monuments

DESCRIPTION: This item shall consist of installing street property sideline monuments at all street intersections and at all points of curvature and tangency or other critical points in the street lines as will enable a land surveyor to correctly stake out any lot in the subdivision.

MATERIALS: Reinforced concrete monuments shall be those as manufactured by S.T. Griswold, or equal, and shall be 4" x 4" x 36". The top shall have a marked center, which shall be the point of reference.

CONSTRUCTION METHODS: The monuments shall be set vertically and to a depth so that the top of the monument will project 1/2" above the surrounding ground surface. The monuments shall be set in place after all other street improvements are completed. The monument's location shall be established by a surveyor licensed to practice in the State of Vermont.

Planting of Trees

The Selectboard of the Town of Jericho will require the planting of new trees in areas where no trees presently exist, within the area disturbed by the new construction, or in an area in which substantial loss of trees has or will occur in the process of road construction. Such trees shall be preferably of a type indigenous to the neighborhood. Such trees shall be planted in fertile or fertilized ground and shall be watered and nurtured after planting until growth is assured. Trees shall have a minimum trunk diameter, 4' above ground level, of at least 2". They shall be planted at intervals of no more than 60' on both sides of the street. Such trees shall be clear of any branches from ground level to a point 6' above ground level. Trees shall be subject to the two-year maintenance escrow period.

Street Guardrail

DESCRIPTION: This item shall consist of the construction of Core 10 (Corrosion Resistant) steel beam and wood or steel post guardrail, conforming to the design indicated on the accepted drawings, Sections 621 and 728 of the Vermont Standard Specifications for Construction, and pages G-1 and G-1d of the Vermont Design Standards. A guardrail shall be erected when the height of fill at the shoulder point is more than 10' with a slope steeper than 1 on 3 or as ordered by the Town. The face of the guardrail shall be set 2' behind the back edge of road shoulder. In areas where guardrail is required, the total shoulder width shall increase from 2' to 4'.

Street Name Signs

DESCRIPTION: This item shall consist of a street name sign with a 2" diameter steel post, constructed in accordance with these specifications and as shown on the approved drawings.

MATERIALS: The post shall consist of a 2" diameter pipe constructed of standard weight galvanized steel with anchors fabricated from 1" by 3/8" band iron.

CONSTRUCTION: The signpost shall have a total length of 10'-6" with an approximate exposed length of 8'. The remaining 2'-6" length shall have an arrangement around the pipe to prevent rotation of the sign after it has been erected. The exposed portion of the post shall have one coat of flat black enamel paint applied before erection. (See Sign Detail Sheet)

The signpost shall be set 2'-6" in the ground, and the backfill material shall be tamped to maximum density so that the post shall be plumb and rigid. Where applicable, the signpost shall be located in the mall between the sidewalk and curb at a point which will not interfere with pedestrian or vehicular travel or winter road maintenance.

WATER DISTRIBUTION

(See Details: Figures 13-15)

Distribution Mains and Appurtenances

DESCRIPTION: This item shall consist of the excavation and backfilling required for the complete construction of water mains, which shall include valves, tees, hydrants, elbows, reducers, and all other appurtenances necessary for a complete water main system as indicated on the approved drawings. All work shall meet the requirements of these specifications or of the water authority with jurisdiction in the project area (Champlain Water District, Fire District #1, Jericho Underhill Water District and any fire additional fire districts as approved by the Selectboard).

MATERIALS: Pipes for all mains shall be minimum diameter of 8" push-on joint class 52 ductile iron manufactured in accordance with AWWA C151 (ANSI 21.51) and shall be cement-lined and seal-coated in accordance with AWWA C104 (ANSI 21.4). Pipe and sizes shall be as shown on the approved plans.

All fittings shall be cast iron with mechanical joints, manufactured in accordance with AWWA C110 (ANSI 21.10) and of the sizes indicated on the plans. All necessary adapters shall be furnished and installed by the Contractor.

All fittings shall be manufactured by U.S. Pipe and Foundry Company, Clow, or an approved equal.

All gate valves shall be Mueller mechanical joint non-rising stem, left opening, iron body, resilient wedge, conforming to AWWA C509 standards, or an approved equal. Packing shall be triple-sealed rubber designed for permanent underground service. All valves shall have a 2-inch AWWA operating nut. Each and every valve shall be tested bubble tight, air-underwater, by the manufacturer according to the following schedule: 8" - 12" 175 PSI or 14" - 16" 150 PSI

A hydrostatic test shall also be performed at a pressure of 300 psi. Results of both tests shall be provided to the Town prior to the installation and shall be certified by the manufacturer.

Locking flanges on mechanical joints shall be installed where required by the Town or Water Authority.

All hydrants shall be Kennedy K-81-D with 5¼" valve opening, 6" mechanical joint inlet, left opening hydrant valve and National Standard Threads on two 2-1/2" and one 4-1/2" nozzle. The Contractor shall provide and install an auxiliary valve of the type indicated on the approved drawings and a length of 6" ductile iron pipe sufficient to connect the hydrant to the main.

The hydrant shall have approximately 18" between the bottom of the steamer cap and the ground. For single-family house subdivisions, there shall be at least one hydrant at each intersection and a maximum of 450' between hydrants with a minimum water flow of 500 gallons per minute at a 20 psi residual pressure from each hydrant. There shall be a 10' x 10' easement around each hydrant. Each hydrant must be at least 4' from the edge of the sidewalk.

CONSTRUCTION METHODS:

- Inspection And Testing: All pipe and fittings shall be inspected and tested in accordance with the manufacturer's specifications and the aforementioned AWWA Specifications. The Contractor shall furnish for approvals certification from the pipe manufacturer that all tests have been performed with satisfactory results. Pipe shall not be installed without the Town's or Water Authority's approval.

- Installation: Pipe, fittings, and accessories shall be carefully handled to avoid damage. Prior to the date of acceptance of the project work, the Contractor shall replace any new pipe or accessory found to be defective at any time, including after installation at his expense. All installation and testing shall be done in accordance with AWWA Standard C600.

All pipe showing cracks shall be rejected. If cracks occur in the pipe, the Contractor may, at his own expense and with the approval of the Town, cut off the cracked portions at a point at least 12" from the visible limits of the crack and use the sound portion of the pipe. All pipe and fittings shall be cleared of all foreign matter and debris prior to installation and shall be kept clean until the time of acceptance by the Town.

At all times, when the pipe laying is not actually in progress, the open ends of the pipe shall be closed by temporary watertight plugs or by other approved means. If water is in the trench when work is resumed, the plug shall not be removed until all danger of water entering the pipe has passed.

The pipe shall be installed in trenches and at the line and grade shown on the drawings. Any deflection at joints shall be within the limits specified by the manufacturer. All piping and appurtenances connected to the equipment shall be supported so that no strain will be imposed on the equipment. (If the equipment manufacturer's specifications include that piping loads are not to be transferred, the Contractor shall submit certification of compliance.)

Concrete thrust blocks shall be installed on all plugs, tees, and bends deflecting 11 1/4 degrees or more. Care shall be taken to ensure that concrete will not come in contact with flanges, joints, or bolts. The required area of thrust blocks are indicated on the plans or shall be as approved by the Town. Conductivity bonds or wedges shall be installed at every pipe joint.

Whenever sewers cross under water mains, the water main shall be laid at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer. This vertical separation shall be maintained for that portion of the water main located within 10 feet horizontally of any sewer it crosses. When it is impossible to obtain horizontal and vertical separation, both the water main and sewer shall be constructed with watertight joints and shall be pressure tested to assure water-tightness before backfilling. No water main shall pass through, or come in contact with, any part of a sewer manhole.

There shall be no physical connection between the distribution system and any pipes, pumps, hydrants, or tanks which are supplied or may be supplied with water that is, or may be, contaminated.

In instances where the use of different types of pipe require joining, the Contractor shall furnish and install all necessary adapters.

All trenching safety standards shall be in conformance with all applicable State and Federal guidelines and as specified on the plans.

The Contractor shall, at all times, keep the trenches entirely free of water until all work is finished and ready for backfilling.

After the various pipelines have been installed, the trenches and other areas to be filled shall be backfilled to subgrade with, wherever possible, material excavated from the trench. No backfilling will be allowed until any concrete masonry has set sufficiently, as determined by the Town. All material for backfilling shall be free of roots, stumps, and frost. Materials used for backfilling trenches shall be free of stones weighing over 30 pounds. No stones measuring over 1-1/2" in the longest dimension shall be placed within 1' of the pipeline being backfilled.

Backfill for all pipe lines shall be placed in 6" layers, each layer being thoroughly compacted to not less than 95 percent of maximum dry density as

determined by the AASHTO-T-99 Standard Proctor. Particular precautions shall be taken in the placement and compaction of the backfill material in order not to damage the pipe or structures. The backfill shall be brought up evenly.

Surplus excavated materials not used for backfill shall be disposed of in a manner satisfactory to the Town. All surplus material or spoil shall be removed promptly and disposed of so as not to be objectionable to abutters or to the general public.

Valve boxes are to be installed on all buried valves. The boxes shall be cast iron with a minimum 5 1/4" diameter and long enough to extend from the valve to finished grade. The boxes shall enclose the operating nut and the stuffing box of the valve. Valve boxes shall not transfer loads into the valve.

Covers shall be close fitting and dirt tight with the top of the cover flush with the top of the box rim. Covers shall be marked "Water" with an arrow indicating the direction of opening.

Valve boxes shall be manufactured by Kennedy, Mueller, or equal.

FIELD TESTING: Except as otherwise directed, all pipelines shall be tested. Pipelines to be bedded or encased in concrete shall be tested prior to the placing of concrete, and any exposed piping shall be tested prior to field painting.

The Contractor shall furnish all gauges, testing plugs, caps, and all other necessary equipment and labor to perform the leakage and pressure test in sections of an approved length. Each valved section or a maximum of one thousand feet of pipe shall be tested. All water required for testing shall be potable. All testing shall be conducted in the presence of the Town.

For the pressure test, the Contractor shall develop and maintain for two hours, 125 percent of the working pressure measured in pounds per square inch, or 200 pounds per square inch, whichever is greater. Failure to hold the designated pressure for the two-hour period constitutes a failure of the section tested.

The leakage test shall be performed concurrently with the pressure test. During the test, the Contractor shall measure the quantity of water required to maintain the test pressure. Leakage shall not exceed the quantity given by:

$$L = ND (\text{Square Root of } P) / 7,400$$

where:

L = leakage in gallons/hour

D = diameter of pipe in inches

N = number of joints in the tested line

P = average test pressure in psi

All testing shall be conducted in accordance AWWA C600 latest revision.

Should any section of pipe fail either the pressure test or leakage test, the Contractor shall do everything necessary to locate, repair and replace the defective pipe, fittings, and joints at his expense.

If, for any reason, the Town should alter the foregoing procedures, the Contractor shall remain responsible for the compliance of the line with the above requirements.

DISINFECTION: Chlorination of the water main shall be conducted only after the main has been flushed and a clear stream is obtained as determined by the Town. The Contractor shall furnish all labor, equipment, materials, and tools necessary to disinfect the pipe and appurtenances in accordance with AWWA Standard for Disinfecting Water Mains C601. The method of disinfection shall be by the continuous feed method unless otherwise approved by the Town. After filling, flushing, and addition of chlorine solution, chlorine concentration within the pipe shall be at least 10mg/l for 24 hours. All disinfection shall be performed under the supervision of the Town. The disinfection process shall be deemed acceptable only after samples of water from the flushed disinfected main show no evidence of bacteriological contamination.

The pipeline and appurtenances shall be maintained in an uncontaminated condition until final acceptance.

FROST PROTECTION OF SHALLOW WATERLINES: Waterlines with less than 5'-6" of cover over the crown, or where indicated on the plans, shall be protected against freezing by installation of 3" thick Styrofoam SM insulating sheets with a width of 3' or twice the pipe diameter, whichever is greater. The sheets shall be placed 6" above the crown of the main after compaction of the 6" lift immediately above the crown. Care shall be exercised by the Contractor during backfill and compaction over the Styrofoam sheets to prevent damage to the sheets. Styrofoam SM sheets shall meet the compressive strength requirements of ASTM D1621-73 and shall be equal to those manufactured by Dow Chemical Company, Midland, Michigan.

House Services

DESCRIPTION: This item shall consist of the installation of individual services from the water main to the ROW line with the necessary corporations, curb stops and curb boxes.

MATERIALS:

- Pipe – Service pipe shall be 3/4" Type "K" Copper Tubing manufactured according to ASTM Specifications B88, or approved equal.
- Corporation stops – All corporation stops shall be constructed of brass according to AWWA Standard C800 and shall be 3/4", threaded/compression, ball valve corporation stops, Mueller or equal. Any request for corporation stops greater than 3/4" shall be subject to the approval of the Town.
- Curb stops – All curb stops shall be constructed of brass according to AWWA Standard C800 and shall be 3/4" inverted plug curb stops, Mueller or equal with compression fittings. Valves shall open left 1/4 turn and shall not have the capability to drain the service line.
- Curb boxes – All curb boxes shall be the adjustable type with arch pattern base, Mueller or equal, with a burial capacity of 5' to 6'. The upper section shall be 1" in diameter for use with 3/4" and 1" curb stops. (Mike deleted stop/drain and meter spacer because they are out of ROW)

CONSTRUCTION METHODS:

- House services – The Contractor shall make all necessary taps into the water main and, for each lot, install an approved brass corporation stop. The Contractor shall connect 3/4" type "K" copper service pipe to the corporation and to the brass curb stop. Such curb stop shall be installed at the property line. The corporation stop shall be left open and the curb stop closed. Such curb stop shall be located not less than 5 feet below the ground surface and shall be accessible from the surface through an approved valve box.

SANITARY SEWERS

(See Details: Figure 16-19)

DESCRIPTION: This item shall consist of the excavation and backfilling required for the complete construction of gravity sanitary sewers, force mains and all appurtenant construction thereto, including chimneys, service connections, thrust blocks, and other items necessary for a complete sanitary sewer system as indicated on the approved drawings. Sewer mains from more than one house shall be a minimum pipe diameter of 8".

MATERIALS:

- Types Of Pipe: Types of pipe which shall be used for the various parts of work are as follows:

Gravity sewers - PVC solid wall pipe, ductile iron pipe, or an approved equal. (ABS removed)

Force Mains – Solid wall PVC or ductile iron rated for a minimum working pressure of 150 psi.

PVC SEWER PIPE: PVC sewer pipe shall conform in all respects to the latest revision of ASTM Specifications D-3034 or F679, Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings, SDR 35. Wall thickness of all PVC pipe shall meet ASTM Specifications for SDR 35 pipe. All pipe and fittings shall be clearly marked as follows:

Manufacturer's Name and Trademark

Nominal Pipe Size

Material Designation 12454C PVC or 12364C PVC

Legend "Type PSM SDR35 PVC Sewer Pipe" or "PS 46 PVC Sewer Pipe"

Designation ASTM D-3034 or F679

Joints shall be push-on type using elastomeric gaskets and shall conform to ASTM D-3212. The gaskets shall be factory installed.

The pipe shall be furnished in nominal 13-foot lengths. Sufficient numbers of short lengths and full machine fittings shall be provided for use at manholes, chimneys, and connections. All connections will require the use of manufactured fittings. Field fabricated, saddle-type connections will not be considered acceptable.

Any pipe or fitting having a crack or other defect or which has received a severe blow shall be marked rejected and removed at once from the work site.

All field cuts are to be made with saw and 90 degree miter box. Bevel the cut end to the same as the factory bevel and remove all interior burrs. Measure and place a homing mark on the pipe before assembling.

Deflection tests shall be performed on all flexible pipe after the final backfill has been in place for at least 30 days. The deflection test shall be run using a rigid ball or mandrel having a diameter equal to 95 percent of the inside diameter of the pipe. No mechanical pulling devices shall be used during the deflection tests. All pipe not meeting the deflection test shall be re-excavated and replaced at the Contractor's expense.

The manhole water stop gasket and stainless steel clamp assembly must be approved by the Town prior to the installation of any pipe.

The Contractor will submit certification that the materials of construction have been sampled, tested, inspected, and meet all the requirements including wall thickness

in accordance with ASTM D-3034 or ASTM F679 for all pipe and fittings to be included in the project work.

PVC pipe shall not be installed when the temperature drops below 32 degrees Fahrenheit or goes above 100 degrees Fahrenheit. During cold weather, the flexibility and impact resistance of PVC pipe is reduced. Extra care is required when handling PVC pipe during cold weather.

PVC pipe shall not be stored outside and exposed to prolonged periods of sunlight, as pipe discoloration and reduction in pipe impact strength will occur. Canvas or other opaque material shall be used to cover PVC pipe stored onsite.

DUCTILE IRON PIPE: Ductile iron pipe shall be the thickness class designated on the plans. All ductile iron pipe shall be centrifugally cast in molds and shall conform to the latest revision of ANSI Standard A21.51 (AWWA C151); ANSI Standard A21.11 (AWWA C111), Rubber Gasket Joints for Cast Iron and Ductile Iron Pressure Pipe and Fittings; and ANSI Standard A21.10 (AWWA C110), Gray-Iron and Ductile Iron Fittings 2 Inch Through 48 Inch for Water and Other Liquids. All ductile iron pipe shall be cement-lined and shall conform to ANSI Standard A21.4 (AWWA C104), Cement-Mortar Lining for Cast Iron and Ductile Iron Pipe and Fittings for Water.

All fittings shall be push-on joint fittings, unless noted otherwise on the plans with body, thickness and radii of accordance with Sections 11-2 through 11-5 and 11-7 through 11-8 of ANSI A21.11.

Mechanical joint, ductile iron pipe shall be the thickness class designated on the plans and shall be installed where specified on the plans. Mechanical joint ductile iron pipe shall conform to the specifications of ductile iron pipe, except for fittings, which shall be mechanical joint with body thickness and radius of curvature conforming to ANSI A2.1.1.0 and mechanical joints, which shall be in accord with Sections 11-2 through 11-6 of ANSI A21.11.

➤ **Polyethylene Encasement for Ductile Iron Pipe:** Where indicated on the plans and for the purpose of resisting corrosion, an 8 mil. thick polyethylene wrap shall be provided for the pipe. All material and installation shall be done in accord with the latest version of AWWA Standard C105.

➤ **Manholes:** The Contractor shall construct reinforced concrete manholes and drop manholes to the dimensions and at the locations shown on the approved drawings. All precast reinforced concrete manhole sections shall conform to the latest version of the ASTM Specifications C478. The footing may be either cast-in-place, with Class B concrete, or precast and shall conform to the dimensions indicated on the plans.

Shelves shall be constructed with 3500 psi Class B Concrete as defined in Section 501 of the Vermont Standard Specifications. Inverts for sewer manholes shall be as shown on the plans and details and shall be constructed with Class B concrete or, for straight runs, segments of pipe cut in half longitudinally. Inverts shall have the exact shape of the sewer to which they are connected, and any change in size or direction shall be gradual and even. All construction of sewer manholes must be carried out to ensure watertight work. Any leaks in manholes shall be caulked and completely repaired to the satisfaction of the Town or the entire structure shall be removed and rebuilt.

All manholes are to be provided with copolymer polypropylene plastic rungs with steel reinforcement 8" on center. All manholes shall be provided with tough, gray, cast iron manhole frames and covers. All iron castings shall be thoroughly cleaned and then coated with hot tar before being delivered. Frames and covers shall be

LeBaron LC 266 Type-C, or an approved equal, and have a minimum weight of 400 pounds.

Precast risers and bases for manholes shall conform to ASTM Specifications C-361. The pipe opening in the precast manhole riser shall have a cast-in-place flexible gasket or an equivalent system for pipe installation as approved by the Town. Joints between manhole risers shall be rubber "O" ring seals or soft Butyl joint sealer (rope form). The manhole cover frames shall be set to final grade only after the base course paving has been completed. Manholes shall be constructed to grade with precast concrete grade rings. No bricks shall be allowed. With the exception of inverts, all surfaces of manhole brickwork shall be plastered with cement mortar, the plaster being carried up as the brickwork progresses, and all manhole lift holes shall be grouted inside and out with expandable grout.

Manholes shall be placed at all changes in slope, size, alignment of pipe, at the ends of each line, and at least every 300'.

➤ **Masonry:** Each brick shall be wetted and completely bedded in mortar at its bottom, sides, and ends in one operation with care being taken to fill every joint. Brickwork shall be well bonded, and joints shall be as close as practicable. No brick masonry shall be laid in water nor shall any water be allowed to rise on or around any brick masonry until it has set at least 24 hours. No masonry shall be laid in freezing weather.

The brick for ordinary brickwork shall be common hard-burned clay brick. All brick shall be regular and uniform in shape and size with plane, parallel beds and faces. Ordinary brick shall conform to ASTM Specification C-62, latest version, and shall be Grade SW.

Brick masonry shall be laid in Portland cement mortar composed of one part Portland cement and two parts of sand, measured by volume, to which not more than 10 pounds of lime shall be added for each bag of cement. Water for mortar shall be clean and only an amount sufficient to produce a workable mortar shall be used. Mortar shall be used within one hour from the time the cement was added to the mix. The sand for mortar for brick masonry shall be uniformly graded, clean, sharp, and contain no grains larger than will pass a 1/8" mesh screen.

CONSTRUCTION METHODS:

➤ **Excavations:** Excavations shall be made to a point at least 6" below the pipe invert to accommodate the bedding material. All excavations are to be kept dry while pipe is being laid and until each joint and pipe has been inspected by the Town and approval given to commence backfilling operations.

➤ **Laying Sewer Pipe:** The bell end of the pipe shall face upgrade at all times and be placed in such a position as to make the invert even when the succeeding section is inserted. Where required by adverse grading conditions, the Contractor shall fill any gully to make a suitable bedding for the sewer pipe. The fill shall be mechanically compacted to a 95 percent dry density by the AASHTO-T-99, Method A (Standard Proctor) test, upon which the 6" of bedding material shall be placed. Any pipe which is not laid to grade and alignment shall be relaid to the satisfaction of the Town. The bedding material shall be placed and compacted on each side of the pipe to a height equal to one-half the pipe diameter and for the full width of the excavated trench and as shown on the approved plans.

➤ **Backfill:** Backfill shall consist of approved material placed in 6" layers with each layer being thoroughly compacted to not less than 95 percent of maximum dry

density as determined by the AASHTO-T-99 Standard Proctor by means approved by the Town.

Bedding is the material from the trench bottom to a level 6" above the top of pipe. It shall be ¾" to 1-1/2" crushed stone for PVC sewer and shall be crushed stone, gravel or sand for DI sewer. Excavated material with no stones in excess of 3" shall be placed within 18" of the outside of the pipe. Particular precautions shall be taken in placement and compaction of the backfill material in order not to damage and/or break the pipe. The backfill shall be brought up evenly on both sides of the pipe for its full length. Walking or working on the completed pipeline except as may be necessary in tamping or backfilling shall not be permitted until the trench has been backfilled to a height of at least 2' on the top of the pipes. During construction, all openings to the pipe lines shall be protected from the entering of earth or other materials.

➤ **Concrete Cradle and Encasement for Pipe:** Where required on the plans or as directed by the Town, a concrete cradle shall be used to bolster and strengthen the pipe. Where required on the plans or as directed by the Town, concrete encasement of sewer will be made to protect nearby wells or waterlines, for stream crossings or for similar purposes. All concrete shall be 3500 psi Class B as defined in the State of Vermont Standard Specifications, Section 501, and shall meet the requirements of that section.

➤ **Frost Protection for Shallow Sewers:** Sewers with less than 5 ½' of cover over the crown or where indicated on the plans shall be protected against freezing by installation of 3" thick Styrofoam SM insulating sheets with a width of 3' or twice the pipe diameter, whichever is greater. The sheets shall be placed 6" above the crown of the sewer after compaction of the 6" lift immediately above the crown. Care shall be exercised by the Contractor during backfill and compaction over the insulation to prevent damage to the sheets. Styrofoam SM sheets shall meet the compressive strength requirements of ASTM D1621-73 and shall be as manufactured by Dow Chemical Company, Midland, Michigan, or equal.

➤ **Leakage Tests and Allowances for Gravity Sewers:** The low pressure air test shall be used to simulate infiltration or exfiltration rates into or out of all gravity sewers. The Contractor shall furnish all equipment and personnel for conducting the test. Final acceptance of the sewer will depend upon the satisfactory performance of the sewer under test conditions. The test shall be performed on pipe between adjacent manholes after backfilling has been completed and compacted.

All wyes, tees, laterals and stubs shall be plugged with flexible-joint caps, or an acceptable alternate, securely fastened to withstand the internal test pressure. Such plugs or caps shall be readily removable, and their removal shall provide a socket suitable for making a flexible-jointed lateral connection or extension.

Prior to testing for acceptance, the pipe shall be cleaned by passing through the pipe, a full gauge squeegee. It shall be the responsibility of the Contractor to have the pipe clean. Immediately following the pipe cleaning, the pipe installation shall be tested with low-pressure air. Air shall be slowly supplied to the plugged installation until the internal air pressure reaches 4.0 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe. At least two minutes shall be allowed for temperature stabilization before proceeding further.

The pipe line shall be considered acceptable when tested at an average pressure of 3.0 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe if: 1) the total rate of air loss from any section

tested in its entirety between manhole and cleanout structures does not exceed 2.0 cubic feet per minute; or 2) the section under test does not lose air at a rate greater than 0.0030 cubic feet per minute per square foot of internal pipe surface.

The requirements of this specification shall be considered satisfied if the time required in seconds for the pressure to decrease from 3.5 or 2.5 pounds per square inch greater than the back pressure of any ground water that may submerge the pipe is not less than that computed according to the following table.

MINIMUM TEST TIME FOR VARIOUS PIPE SIZES				
Diameter (inches)	Time (Sec/100 ft.)		Diameter (inches)	Time (Sec/100 ft.)
3	10		21	485
4	18		24	634
6	40		27	765
8	70		30	851
10	110		33	935
12	158		36	1020
15	248		39	1105
18	356		42	1190

The table gives the required test time in seconds per 100' of pipe for a given diameter. If there is more than one pipe size in the section of line being tested, compute the time for each diameter and sum the times to find the total required test time.

If the pipe installation fails to meet these requirements, the Contractor shall determine at his own expense, the source or sources of leakage and shall repair (if the extent and type of repairs proposed by the Contractor appear reasonable to the Town) or replace all defective materials or workmanship. The completed pipe installation shall meet the requirements of this test before being considered acceptable.

Since this test does not determine the tightness of manholes, they shall be tested separately. The exfiltration leakage allowance out of manholes shall be no greater than 1 gallon per day per vertical foot of depth. The manhole shall be filled with water to a point 1' above the highest point between manhole sections. In areas of high ground water, there shall be no visible leakage due to infiltration. If a vacuum test is desired, the Contractor shall submit the test specifications to the Town for review and approval.

It is noted that all existing sanitary sewers shall be kept operational until new work has been tested and approved by the Town. At such time, existing sewers and sewer services shall be connected to the new sewers.

➤ **Leakage Test for Force Main:** After force mains have been laid and the trench backfilled, the pipe shall be subjected to a hydrostatic pressure test and a leakage test in accordance with AWWA Standard for Installation of Cast Iron Water Main, AWWA C600 (latest issue), Section 13. The hydrostatic pressure shall be 150 percent of normal operation pressure. The pressure and leakage tests shall be run as specified in the Water Distribution section of this manual.

➤ **Cleaning Pipe Lines and Appurtenances:** Upon completion of construction, all dirt and other foreign material shall be removed from pipelines and their appurtenant constructions. No materials shall be left in the pipelines to impede normal flow through them.

➤ **Sewer Service Connections:** Where required on the plans, sewer service connections for each house shall be constructed of 4" pipe, unless otherwise noted on the approved plans, of the material specified under this section. The pipe shall be laid and its joints made as required for sewer construction in this specification. Open ends of pipes shall be properly sealed to prevent damage and intrusion of foreign matter where hookup to the building sewer is not coincident with sewer main construction. Additionally, the Contractor shall provide a stable, temporary marker approved by the Town from the sewer service invert up to 6" above the finished for ease in locating the end of sewer service connection. In the case of reconnection of existing services, such reconnections will be made only after the new sewer main has been completed, tested, and accepted. The excavation, bedding material, installation, and backfill for service connections shall be the same as for sewer mains.

➤ **Cleanouts for Sewers:** Cleanouts for gravity sewers and force mains shall be provided at locations indicated on the approved plans or as directed by the Town. Cleanout frames and covers shall be of tough gray cast iron. Castings shall be true to pattern and free from flaws. The bearing surface of cleanout frames and covers against each other shall be machined to give continuous contact throughout their circumference. All iron castings shall be thoroughly cleaned and then coated with hot coal tar before being delivered. Details for any proposed force main cleanouts shall be submitted to the Town for approval.

➤ **Chimneys:** Chimneys shall be built of 6" pipe and/or as indicated on the approved drawings. Each chimney shall be plugged or capped at the end until ready to connect to existing services. Chimneys are required where the vertical drop between the finished grade surface and the main sewer line exceeds 15' at the wye for a service connection.

➤ **Thrust Blocks and Anchors:** Concrete thrust blocks or anchors shall be placed at bends, test fittings, and other locations on force mains as shown on the approved drawings or as directed by the Town. Concrete for thrust blocks and anchors shall be 3500 psi Class B Concrete. Steel rods and clamps as required shall be galvanized steel.

Thrust blocks and anchors shall be placed between the fitting and the trench wall with bearing on undisturbed earth. Bearing area shall be as shown on the approved drawings or as required by the Town.

STORM SEWERS

(See Details: Figures 20 and 21)

DESCRIPTION: This item shall consist of catch basins, manholes, and pipe, meeting the specifications for the diameter of pipe required and installed as indicated on the approved drawings.

MATERIALS:

- Types Of Pipe: Types of pipe which may be used for storm drain lines are: Reinforced Concrete Pipe (R.C.P.), Asphalt Coated Corrugated Galvanized Metal Pipe (A.C.C.G.M.P.), Polyvinyl Chloride Pipe (PVC), High Density Polyethylene Pipe (HDPE) or an approved equal. Types of pipe which may be used for culverts are Reinforced Concrete Pipe (R.C.P.), Asphalt Coated Corrugated Galvanized Metal (A.C.C.G.M.P.), High Density Polyethylene Pipe (HDPE) or an approved equal.

REINFORCED CONCRETE PIPE: Pipe shall conform to the Vermont Standard Specifications for Construction, Section 710, and AASHTO, M170.

ASPHALT COATED CORRUGATED GALVANIZED METAL PIPE: Pipe shall conform to standard specification for A.C.C.G.M. pipe, to AASHTO Designation M190.

POLYVINYL CHLORIDE PIPE: Pipe shall conform to ASTM Specification D-3034 or F679, (PVC) Sewer Pipe and Fittings, SDR35.

HIGH DENSITY POLYETHYLENE PIPE: Pipe shall conform to AASHTO Specifications M294 or MP6.

MANHOLES: Where indicated on the approved plans, the Contractor shall furnish and install manholes which meet the requirements of the sanitary sewer manholes of these specifications.

CATCH BASINS: Catch basins shall be constructed of reinforced concrete and shall be provided with cast iron frames and grates. Frames and grates shall be LeBaron LK120, LK450 (for grades exceeding 5%), or approved equal. Precast risers and base sections shall conform to the Vermont Standard Specifications for Construction, Section 604. Frames shall be brought to grade with precast concrete grade rings; bricks shall not be allowed. All work shall be constructed in accordance with the masonry specifications for sanitary sewers in these specifications.

Factory installed boots shall be used for all pipe openings to insure a watertight seal.

The frames shall be set to final grade only after the base course paving has been completed.

CONSTRUCTION METHODS:

- Laying Pipe: Storm drains and culverts shall be constructed in accordance with the Vermont Standard Specifications for Construction, Section 601, and on a trench bottom prepared and bedded as shown on the approved drawings. Each pipe shall be checked just prior to laying to ensure that it is clear of all dirt and debris and shall be laid true to line and grade as indicated on the approved drawings. All joints shall be tight and inverts shall be continuous.

Metal pipe shall be firmly joined with coupling bands, concrete pipe joints shall be a rubber gasket type, PVC pipe shall be joined with standard push-on joints using elastomeric gaskets and HDPE pipe shall utilize a factory bell and spigot joint. Storm drains and culverts with water flow velocities greater than 12 feet per second shall require special design which must be approved by the Town.

- Backfilling: All material for backfilling shall be free of roots, stumps, and frost. Backfill for all pipe lines shall be placed in 6" layers, each layer being thoroughly compacted to not less than 95 percent of maximum dry density as determined by the ASTM D698 Standard Proctor by a means approved by the Town.
- Pipe Bedding: Reinforced concrete pipe and asphalt coated corrugated galvanized metal pipe shall be bedded from the trench bottom to a height of 2' above the top of the pipe with material excavated from the trench having no stones larger than 3" in the longest dimension. Should no excavated material be suitable, sand or gravel shall be used.
- HDPE and PVC pipe shall be bedded to the center of the pipe with crushed stone, fine gravel or sand and then backfilled to a point 2' above the pipe with material excavated from the trench having no stones larger than 3" in the longest dimension. Sand or gravel shall be used if no excavated material is suitable.
- Headwalls: The Contractor shall construct pipe headwalls at the inlet and outlet ends of all culverts and storm lines or as ordered by the Town. Headwalls shall be either specifically designed asphalt coated corrugated galvanized metal end sections, HDPE end sections, concrete, or rubble masonry construction. If constructed of concrete or masonry rubble, headwalls shall conform to the Vermont Standard Specifications for Construction, Section 602. All concrete utilized for the purpose shall meet the requirements for 3500 psi Class B Concrete per the Vermont Standard Specifications for Construction, Section 501. Metal end sections shall conform to the Vermont Standard Specifications for Construction, Section 711.

LIGHTING

(See Details – Figures 28-31)

DESCRIPTION: This item shall consist of installing appropriate street, walkway or area lighting, in locations approved by the Town and in accordance with these specifications.

MATERIALS: Lighting for streets, both public and private, shall be the Lumec Octagonal Lantern (L70-PCFC-100MH-SE3-120-SF70-HS-RTAF800F-14-GFI-BKTX) as manufactured by Lumec, 640-Cure-Boivin, Boisbriand, Quebec, CN J7G-2A7 (450) 430-7040. The fixtures shall include frosted clear polycarbonate lenses, 100 watt metal halide lamps, SE optics with hydro-formed cutoff reflector system, the house-shield luminaire option and shall be set on 14' high model RTAF800F tapered and fluted decorative aluminum poles, resulting in a fixture height of 16'. The finish on lanterns and poles shall be textured black.

Lighting for walkways and small sites/parking areas shall be the Lumec Octagonal Lantern (L70-PCFC-75MH-SE3-120-SF70-HS-RTAF800F-10-GFI-BKTX) as manufactured by Lumec as noted above. Fixtures shall be as specified above for street lighting, except that lamp wattage shall be no more than 70 watts and house-shield will be required only where glare is an issue for adjacent structures. For walkways, the asymmetrical SE3 light pattern is appropriate, while for area lighting the symmetrical SE5 pattern is suitable. Poles shall be as noted above, except the height shall be 10' for a fixture height of 12'.

Lighting for large sites/parking lots shall be an appropriate "shoebox" style fixture, either single or double per pole, utilizing a metal halide lamp no greater than 175 watts. Actual wattage will be determined by lighting performance standards as outlined below. The fixtures shall include a full cutoff reflector system and fixture height shall not exceed 20'. The finish shall be black or as otherwise approved by the Town. It is envisioned that each large site requiring this light style will be analyzed photometrically in order to define the number and spacing of the light standards.

Any lights located in the clear zone of a State Highway, or in other locations as specified by the Town, shall be mounted on frangible or break-away bases, per AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signs.

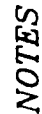
Metal halide lamps shall have a Correlated Color Temperature (CCT) between 3200K and 3700K.

CONSTRUCTION: All light poles shall be mounted on circular, poured-in-place concrete bases which shall be set in the ground to a depth of no less than 4'-0" and which shall extend no greater than 3" above the finished grade (6" for parking lots). Anchor bolts, as needed for the pole, shall be set in the concrete base. A conduit(s) for power supply shall be terminated at the top center of the base. Base diameter for the Lumec poles shall be 18" and for the "shoebox" large site lighting, it shall be as appropriate for the chosen pole. All concrete bases shall include a chamfered outer edge.

All electrical work shall conform to the National Electrical Code. Lights may be actuated by timers or by photo-electric cells, as approved by the Town.

PERFORMANCE: The following lighting performance guidelines shall apply for the various lighting applications.

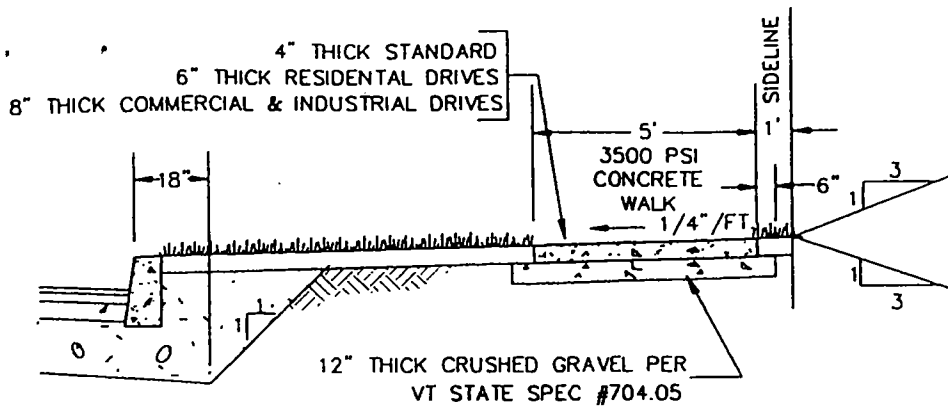
<u>Application</u>	<u>Ave. lighting level</u>	<u>Min. lighting level</u>	<u>Uniformity ratio</u>
Street	0.6 to 1.0 FC	-	4:1
Walkway	0.3 to 0.5 FC	-	-
Parking	-	0.2 to 0.3 FC	4:1



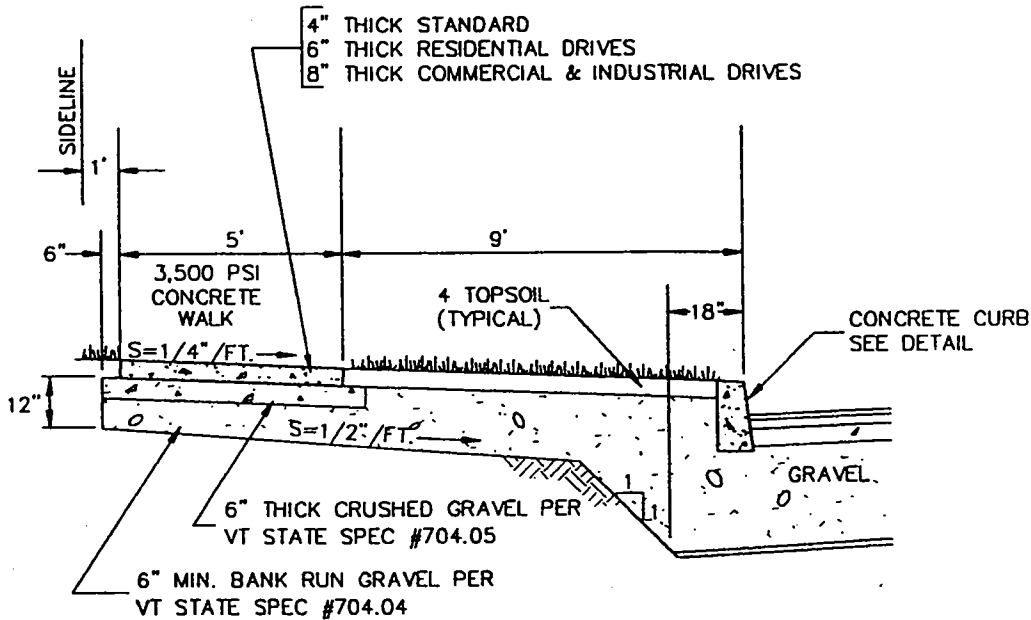
- JERICHO CURBED STREET DETAIL



- JERICHO NON-CURBED ROAD DETAIL**



STANDARD SECTION ROADWAY



SPECIAL SECTION ROADWAY

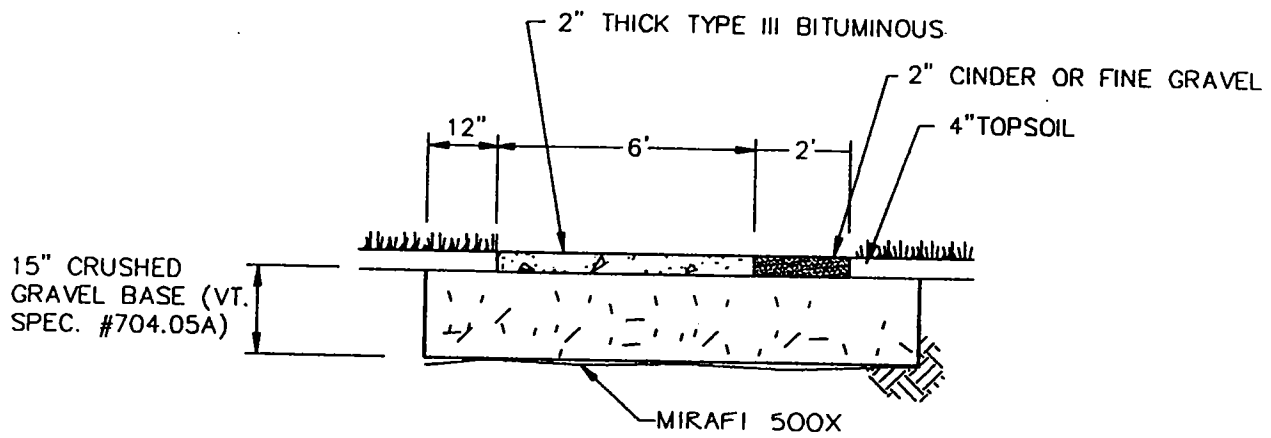
NOTES:

1. CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 3,500 PSI AT 28 DAYS AND SHALL BE AIR ENTRAINED WITH AN ADMIXTURE PRODUCING AN AIR CONTENT OF 5% TO 7% BY VOLUME.
2. HALF INCH (1/2") TRANSVERSE EXPANSION JOINTS SHALL BE PLACED AT INTERVALS NOT EXCEEDING TWENTY FEET (20'). SIDEWALKS SHALL BE SCORED TO A DEPTH OF ONE INCH (1") EVERY FIVE (5') FEET. CURB AND SIDEWALK SECTIONS SHALL BE SEPARATED BY A PREMOLDED JOINT FILLER.
3. AFTER THE INITIAL CURING PERIOD IS OVER (APPROXIMATELY 28 DAYS), ALL EXPOSED SURFACES SHALL RECEIVE TWO COATS OF ANTI-SPALLING COMPOUND.
4. SEE WRITTEN SPECIFICATION FOR APPROVED CONSTRUCTION METHODS AND MATERIAL REQUIREMENTS.

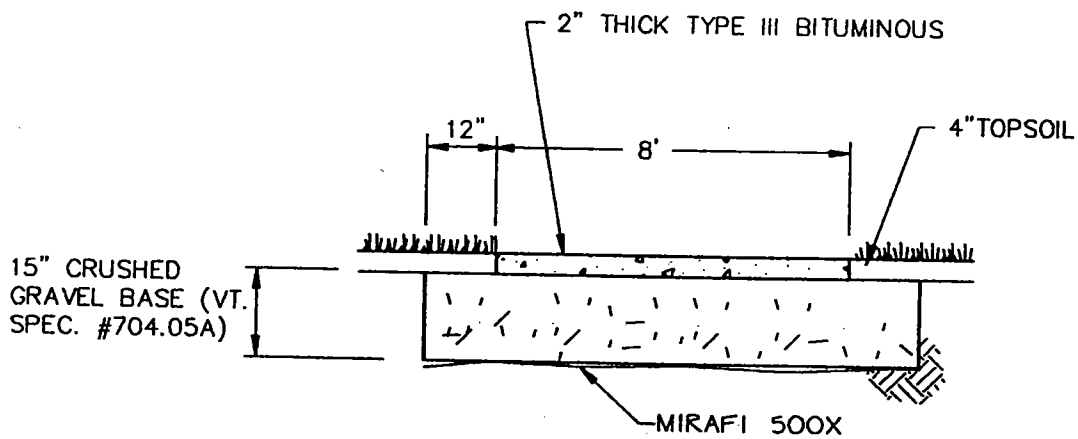
CONCRETE SIDEWALK DETAIL

N.T.S.

FIGURE 3



SECTION WITH CINDER SHOULDER

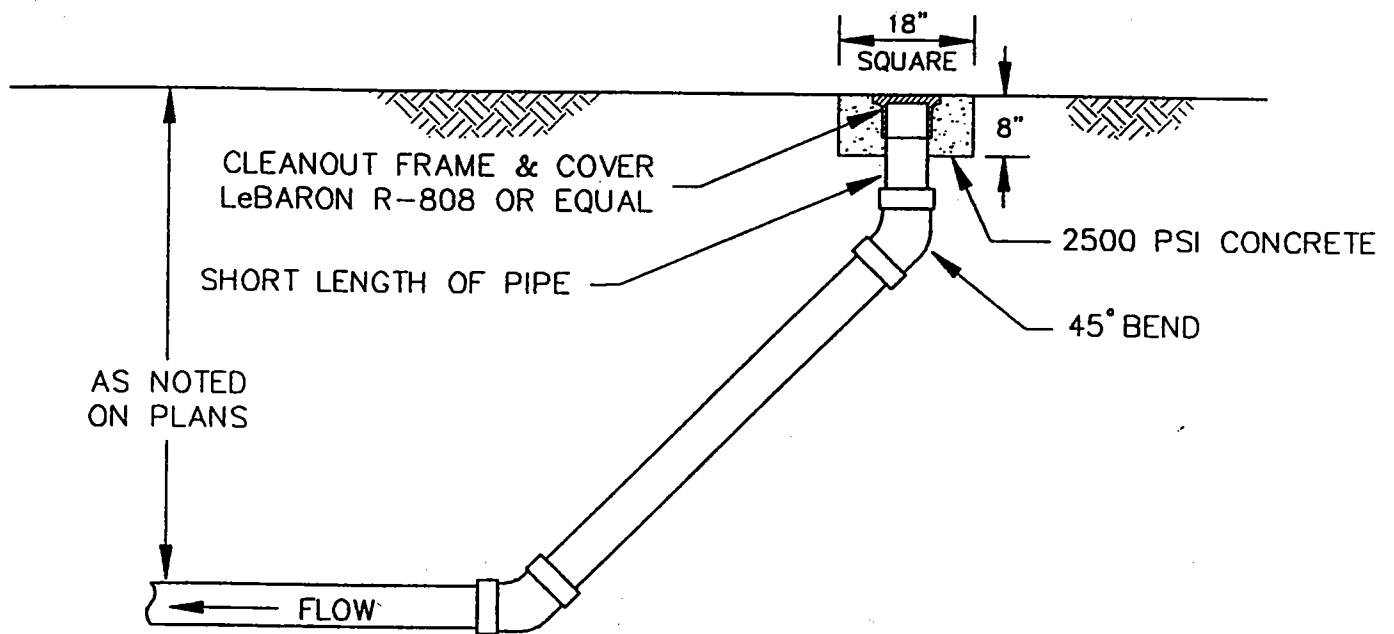


SECTION WITH 8' BITUMINOUS PAVEMENT PATH

MULTI USE PATH DETAIL

N.T.S.

FIGURE 3A

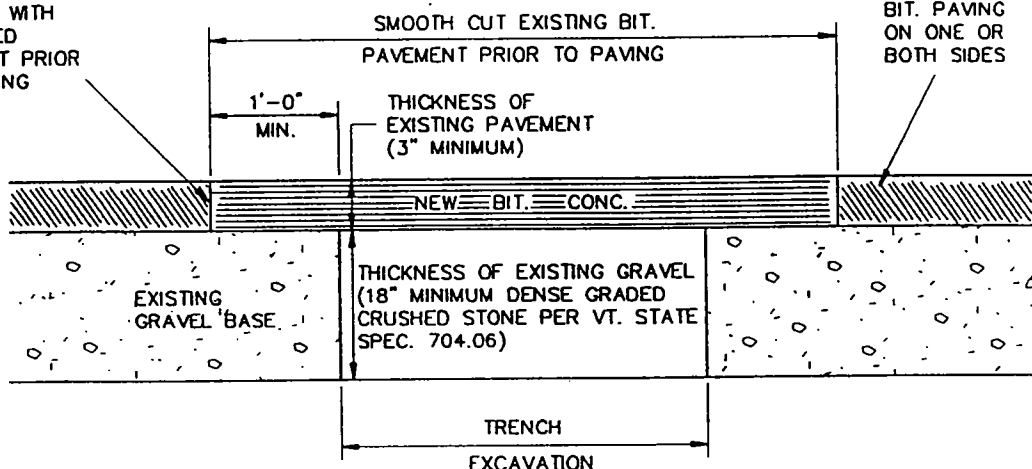


STREET CLEANOUT DETAIL

NTS

FIGURE 5

ALL JOINTS SHALL
BE THOROUGHLY
CLEANED AND
COATED WITH
EMULFIED
ASPHALT PRIOR
TO PAVING

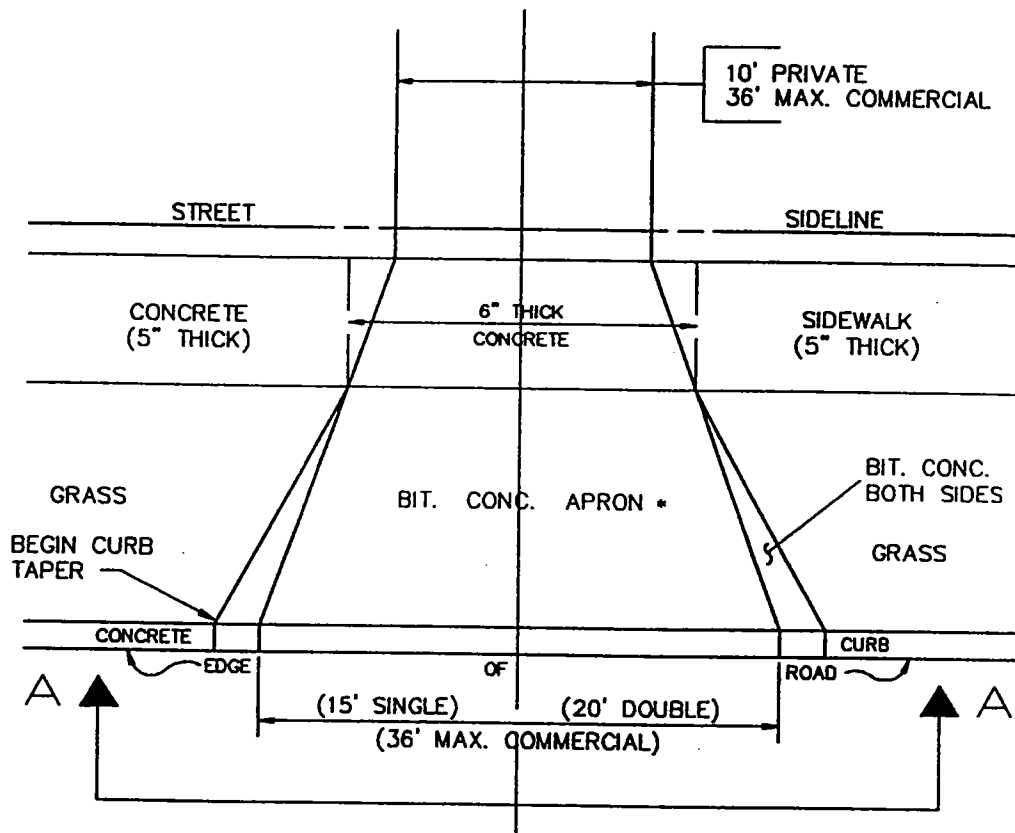
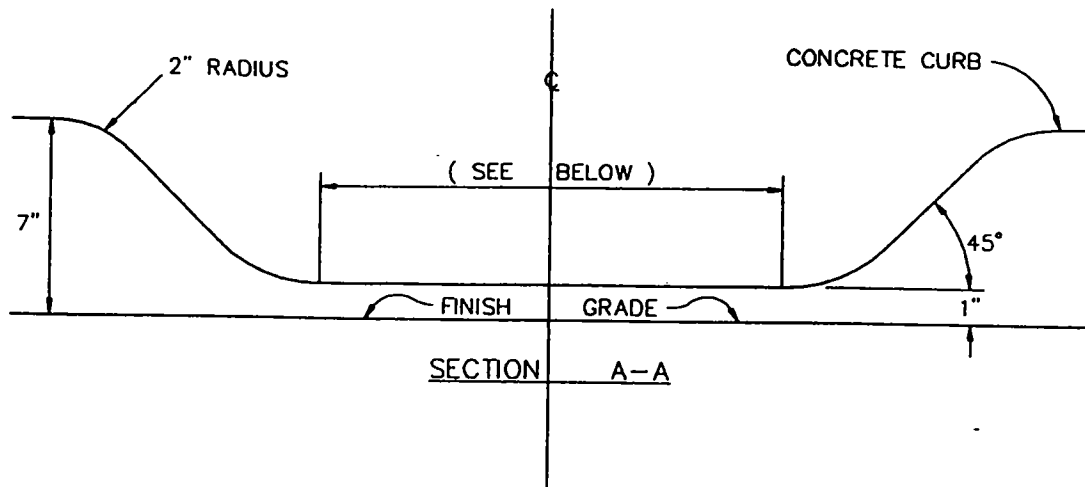


REPLACEMENT of EXISTING BITUMINOUS PAVEMENT

NTS

1. SETUP AND MAINTAIN SIGNS AND OTHER SAFETY CONTROL DEVICES.
2. RESHAPE HOLE AND PATCH AREA BY CUTTING WITH CONCRETE SAW INTO A SQUARE OR RECTANGULAR SHAPE. CUT SIDE FACES VERTICALLY. RESHAPE DOWNWARD TO SOLID MATERIAL AND AROUND HOLE TO SOLID PAVEMENT.
3. BACKFILL TRENCH IN 6" LIFTS AND COMPACT EACH LIFT TO 95% OF MAXIMUM DENSITY OF OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D698 STANDARD PROCTOR.
4. REMOVE ALL LOOSE MATERIAL AND THOROUGHLY SWEEP THE HOLE AREA CLEAN OF MUD AND STANDING WATER.
5. APPLY LIQUID EMULSION (RS-1) TO VERTICAL FACES IN A UNIFORM MANNER. DO NOT PUDDLE EMULSION ON BOTTOM OF THE HOLE.
6. FILL TOP OF HOLE WITH TYPE III BITUMINOUS CONCRETE AND COMPACT IN LIFTS OF NO MORE THAN 2". FINAL LIFT SHOULD BE 1/2" TO 1" ABOVE ADJOINING PAVEMENT BEFORE COMPACTION SO THAT AFTER COMPACTION THE PATCH IS LEVEL WITH THE EXISTING PAVEMENT. EACH LIFT SHOULD BE THOROUGHLY COMPACTIONED WITH A VIBRATORY PLATE COMPACTOR OR A VIBRATORY PORTABLE ROLLER. EXPERIENCE HAS SHOWN THAT 15 TO 20 PASSES ARE REQUIRED WITH A VIBRATORY ROLLER AND A MIX TEMPERATURE ABOVE 250 DEGREES F ARE NECESSARY TO ENSURE GOOD COMPACTION. HAND TAMP SHOULD ONLY BE USES FOR SMALL AREAS (LESS THAN 1 S.F.).
7. CLEANUP AREA. DO NOT LEAVE EXCESS FILL OR EXCAVATED MATERIAL ON THE PAVEMENT. REMOVE SAFETY SIGNS AND DEVICES.

FIGURE 6

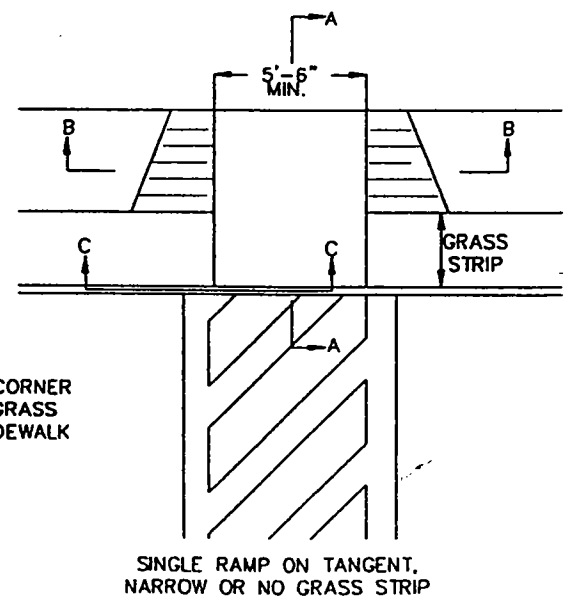
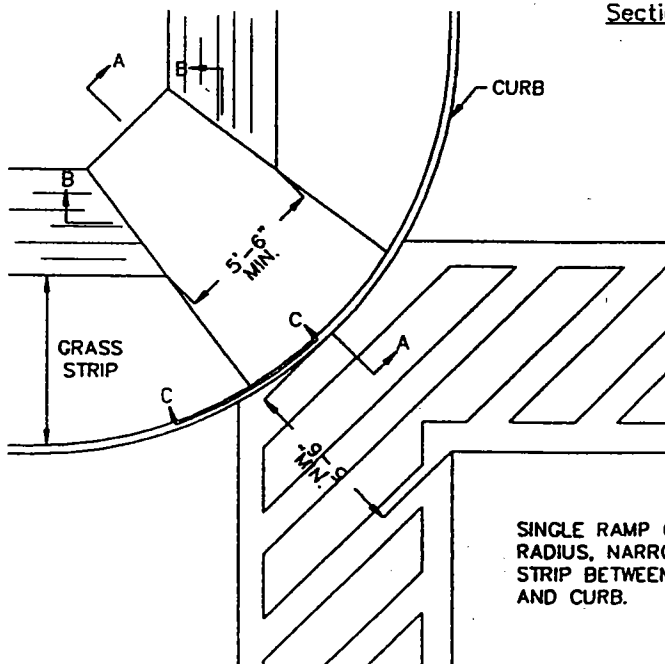
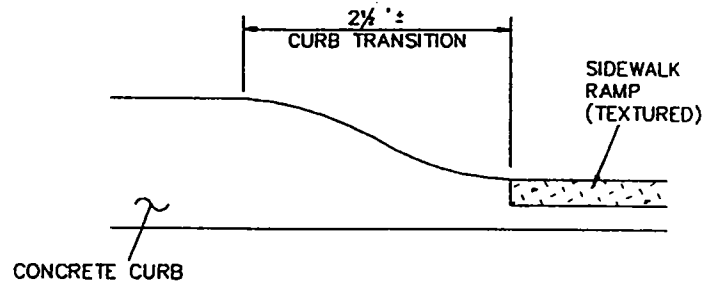
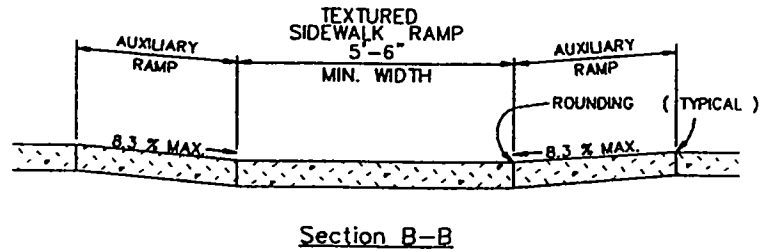
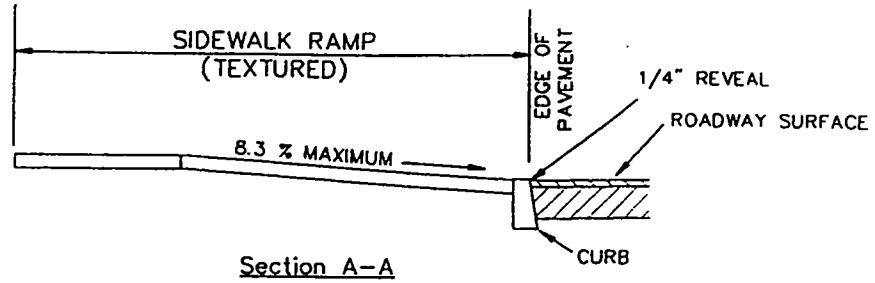


* 2" THICK BIT. RESIDENTIAL
3" THICK BIT. COMMERCIAL
GRAVEL BASE SHALL BE THE
SAME DEPTH AS THE ROAD
SECTION.

DRIVEWAY APRON & CURB CUT

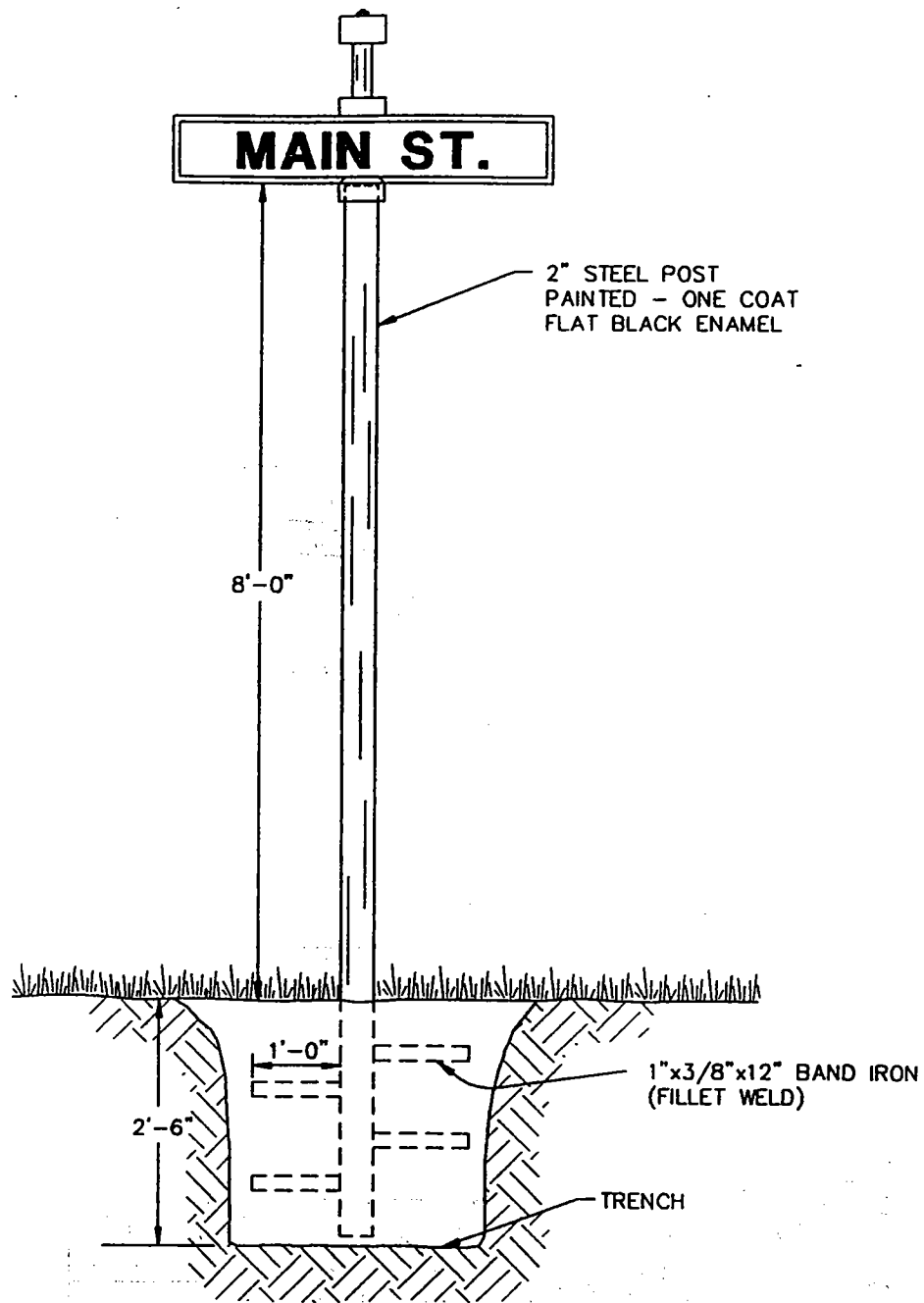
NTS

FIGURE 7



SIDEWALK RAMP

NTS

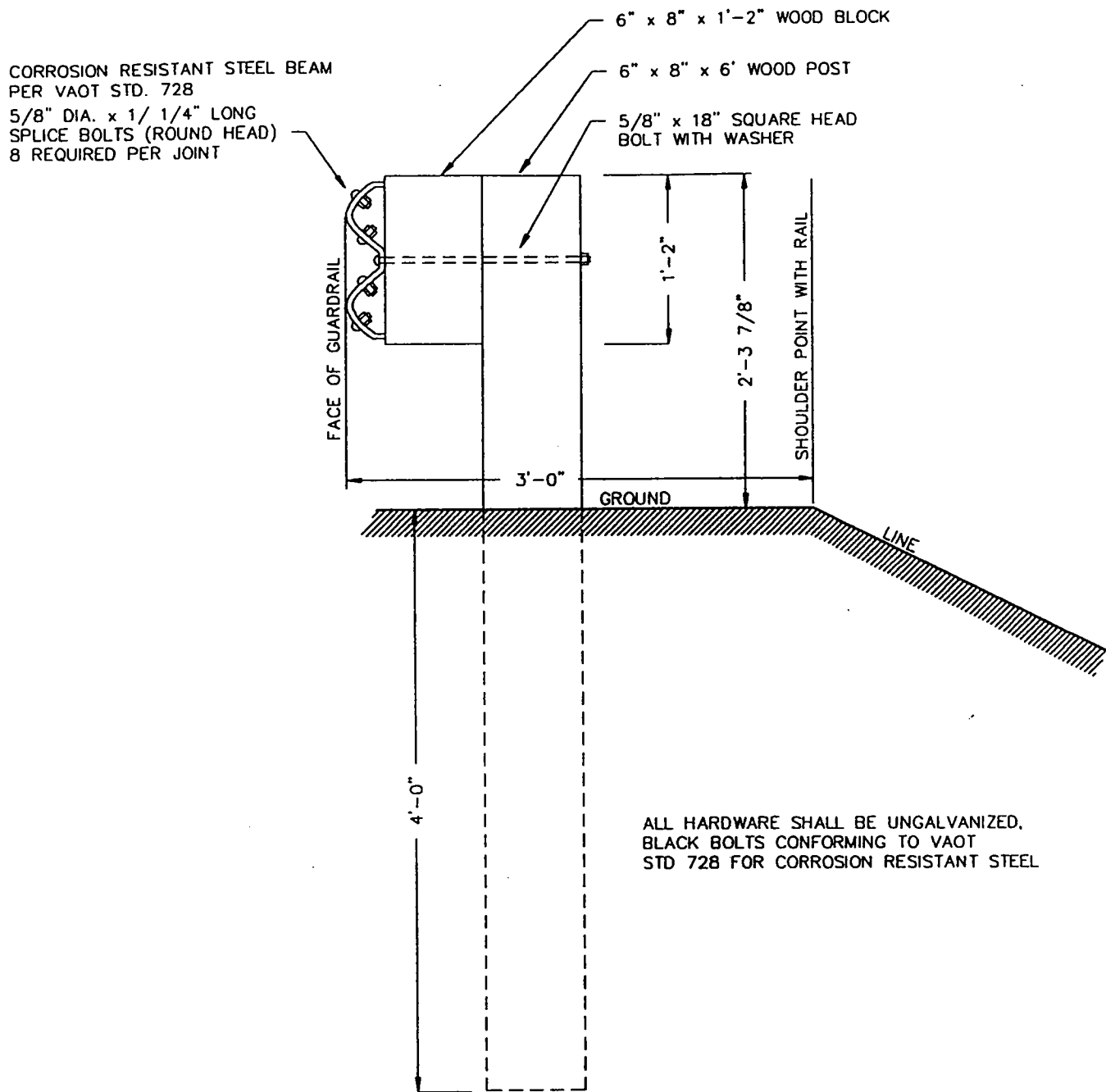


STREET DETAILS

STREET NAME SIGNS

NTS

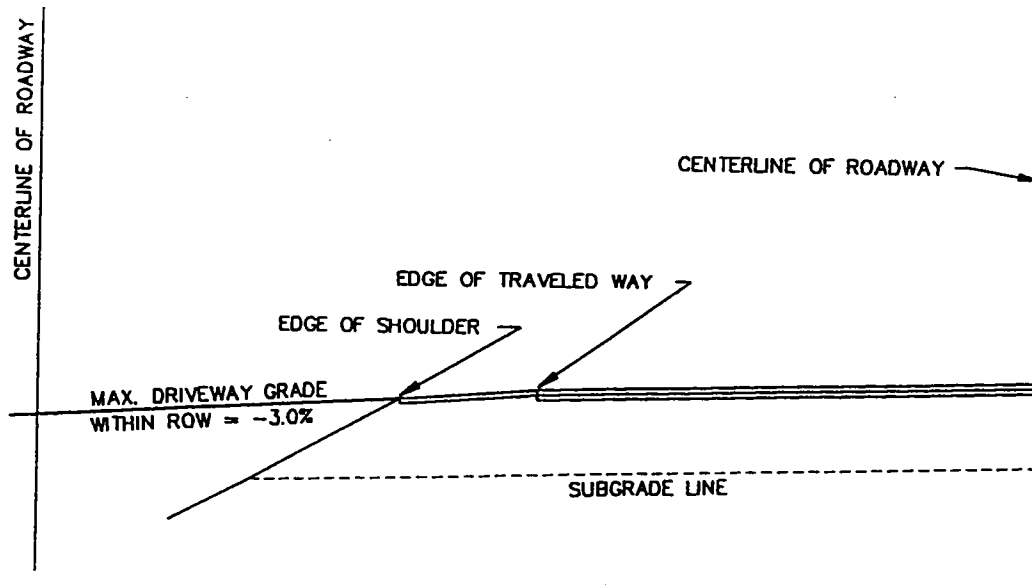
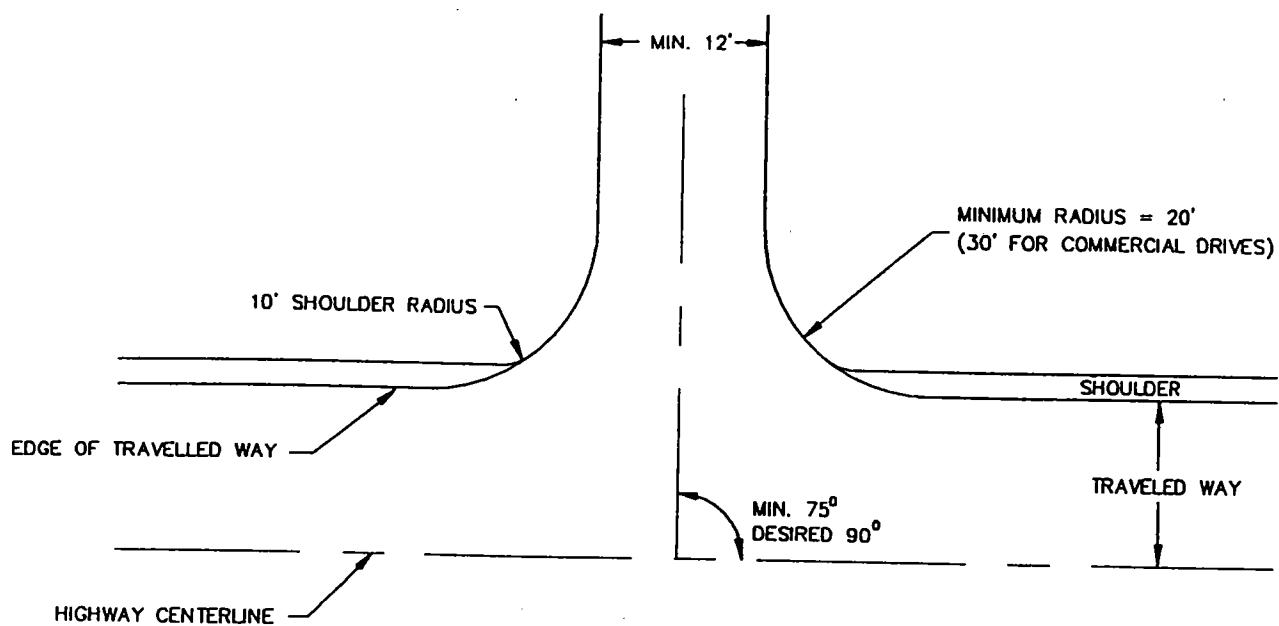
FIGURE 9



GUARDRAIL DETAIL

NTS - SEE V.A.O.T. SPEC. SHEET G-1

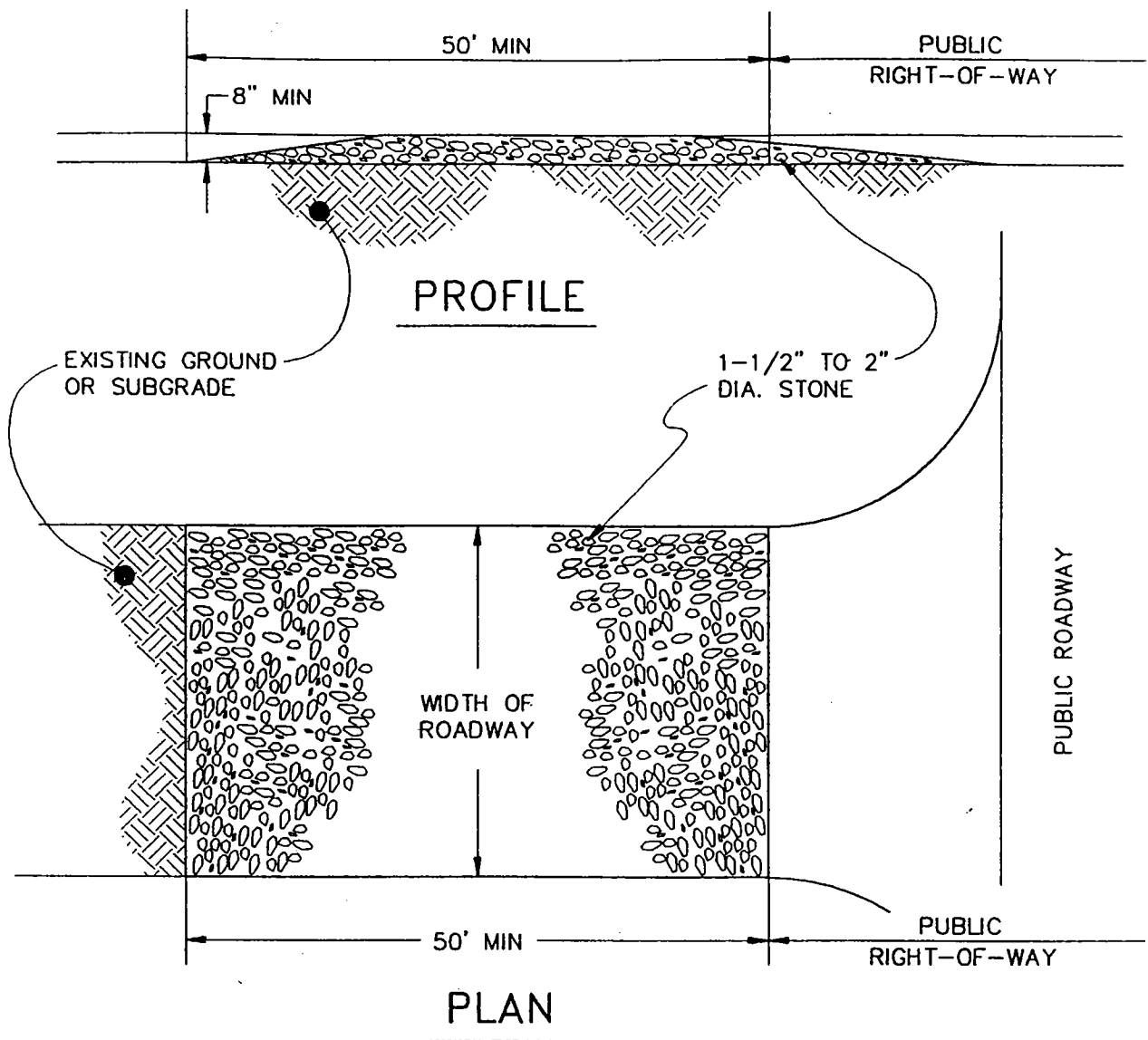
FIGURE 10



DRIVEWAY STANDARDS

NTS

FIGURE 11



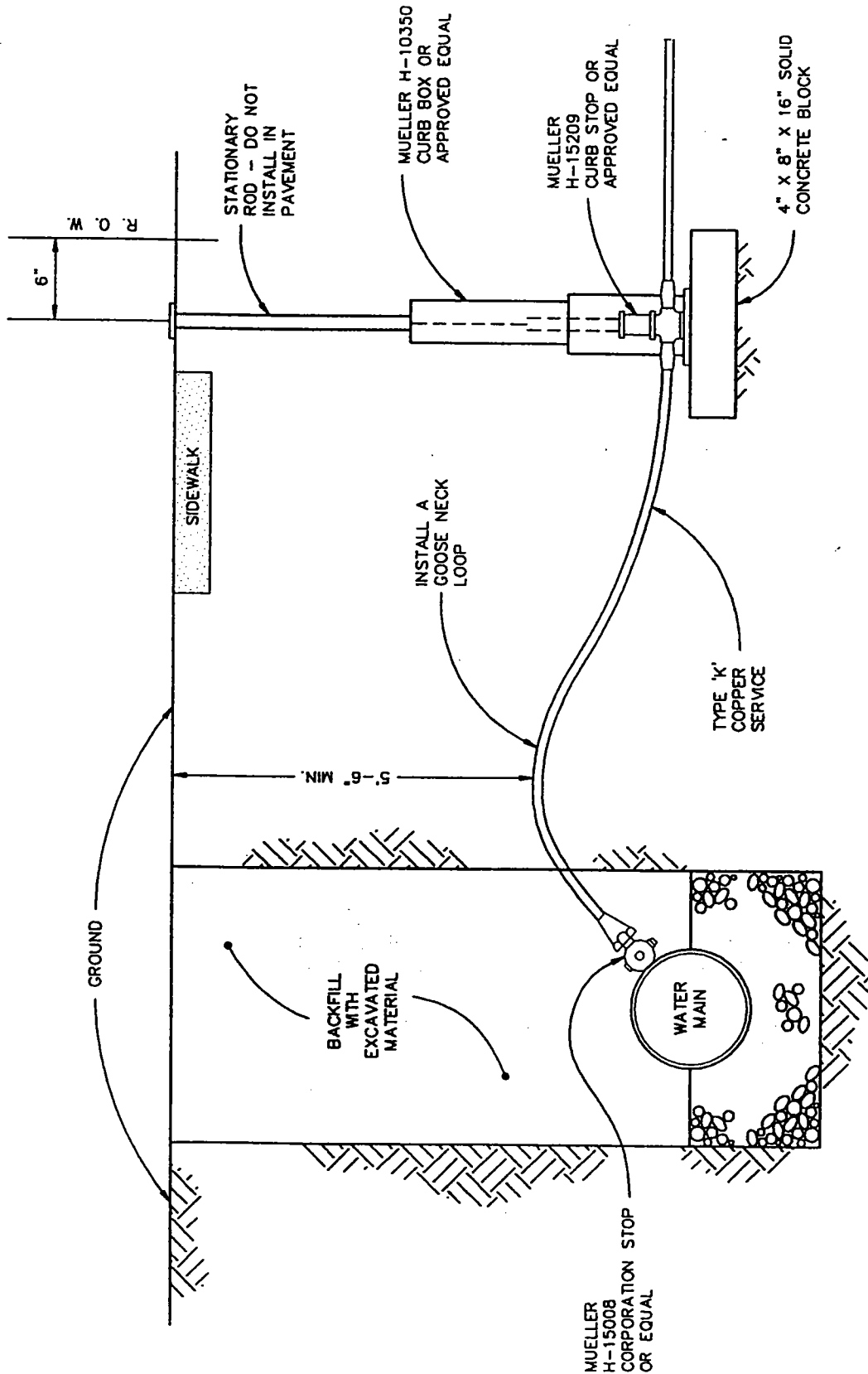
NOTES:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OF SEDIMENT ONTO PUBLIC RIGHTS-OF -WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT TRACKED, SPILLED, OR WASHED ONTO PUBLIC RIGHTS-OF-WAY SHALL BE REMOVED IMMEDIATELY BY THE CONTRACTOR.
2. THE USE OF CALCIUM CHLORIDE OR WATER MAY BE NECESSARY TO CONTROL DUST DURING THE SUMMER.
3. PROVIDE APPROPRIATE TRANSITION BETWEEN STABILIZED CONSTRUCTION ENTRANCE AND PUBLIC RIGHT-OF-WAY.

STABILIZED CONSTRUCTION ENTRANCE

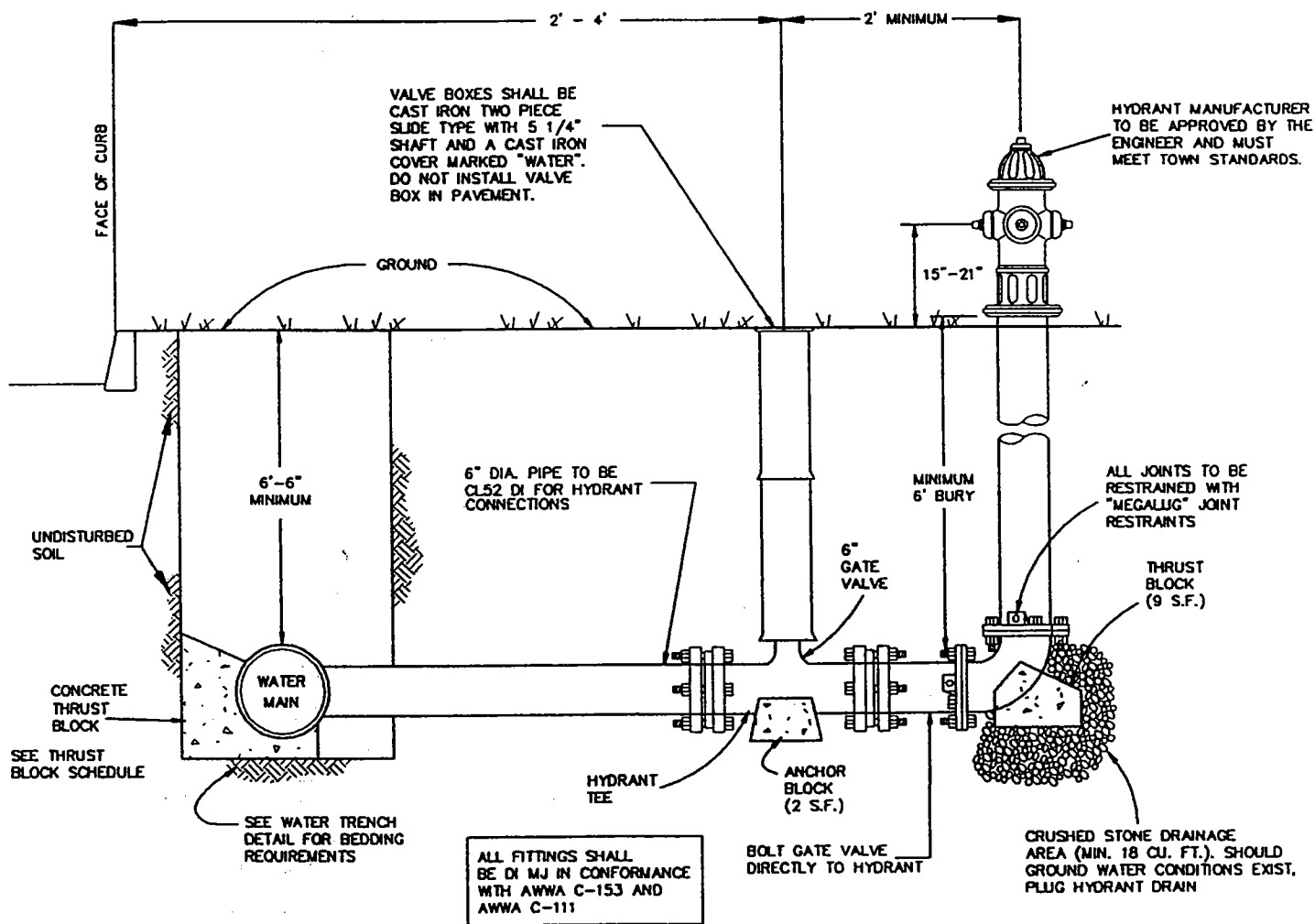
NTS

FIGURE 12



WATER SERVICE DETAIL

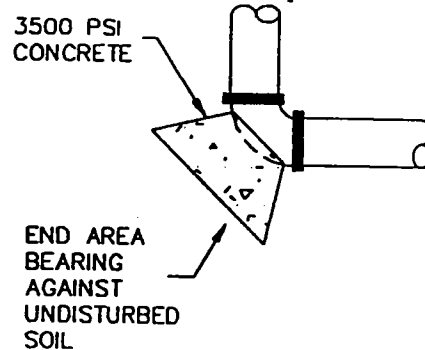
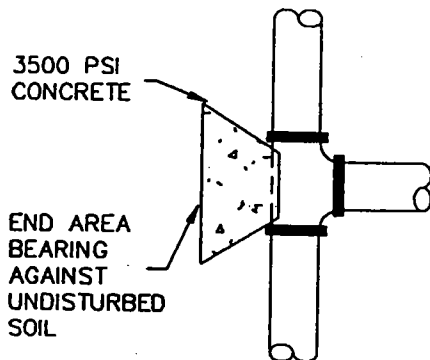
NTS



HYDRANT DETAIL

NTS

FIGURE 14



TYPICAL TEES-DEADENDS-CAPS

TYPICAL BENDS

NOTE: PLACE 4 mil POLYETHYLENE BETWEEN FITTING AND THRUST BLOCK

SOIL TYPE - CLAY/SILT

SIZE FITTING	6"	8"	12"
11¼ & 22½	3	4	9
45°	4	8	17
90°	9	16	35
TEES OR END CAPS	6	11	25
VALVES	3	3	3

SQ FT BEARING AREA

BASED ON 100 PSI WORKING
PRESSURE PLUS 100 PSI SURGE
ALLOWANCE AND BEARING
CAPACITY OF 1000 LBS/SQ FT

SOIL TYPE - SAND

SIZE FITTING	6"	8"	12"
11¼ & 22½	2	2	5
45°	2	4	9
90°	4	8	17
TEES OR END CAPS	3	6	12
VALVES	2	2	2

SQ FT BEARING AREA

BASED ON 100 PSI WORKING
PRESSURE PLUS 100 PSI SURGE
ALLOWANCE AND BEARING
CAPACITY OF 2000 LBS/SQ FT

SOIL TYPE - TILL/SHALE

SIZE FITTING	6"	8"	12"
11¼ & 22½	1	1	2
45°	1	2	4
90°	2	4	9
TEES OR END CAPS	2	3	6
VALVES	2	2	2

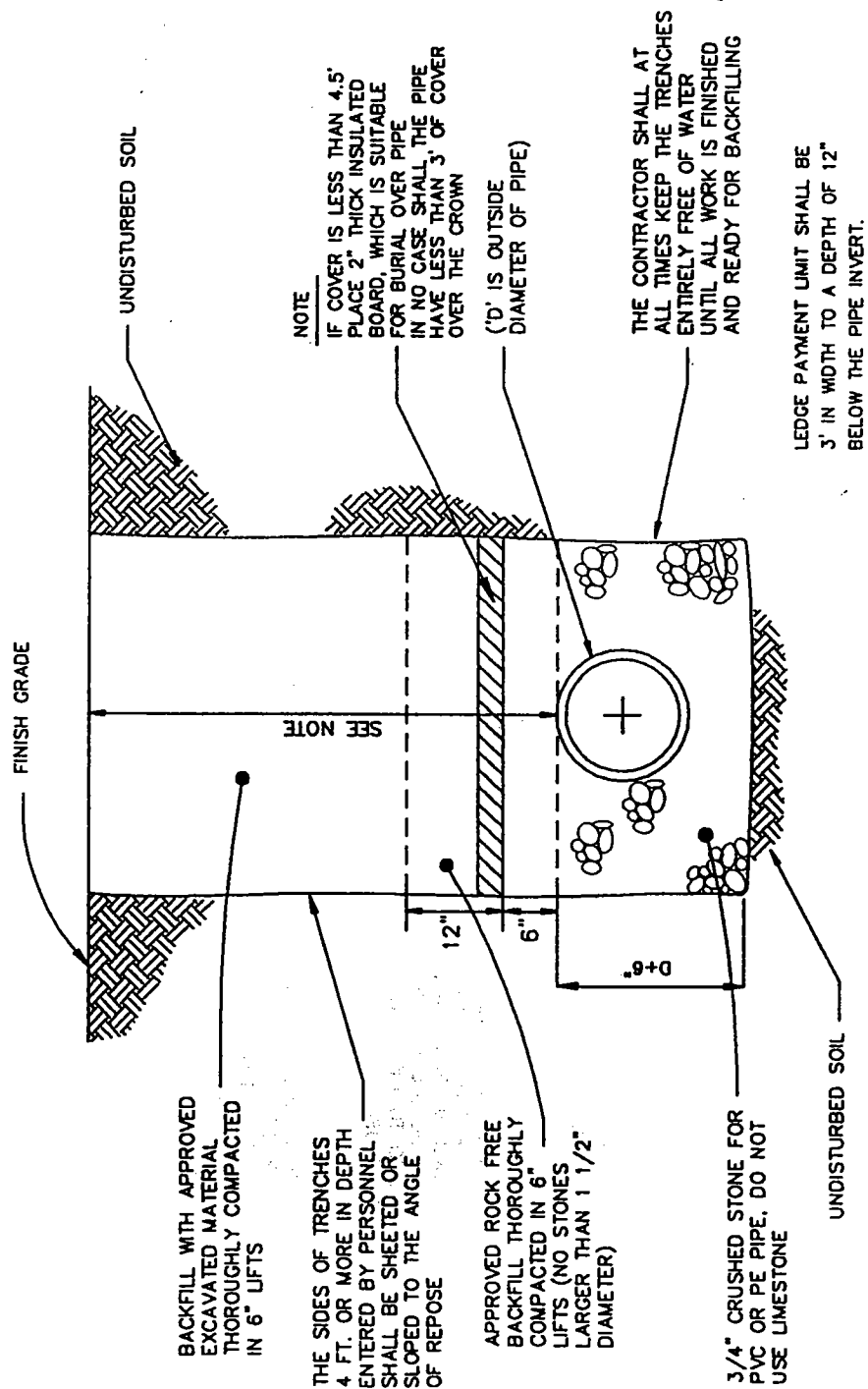
SQ FT BEARING AREA

BASED ON 100 PSI WORKING
PRESSURE PLUS 100 PSI SURGE
ALLOWANCE AND BEARING
CAPACITY OF 4000 LBS/SQ FT

THRUST BLOCK END AREA

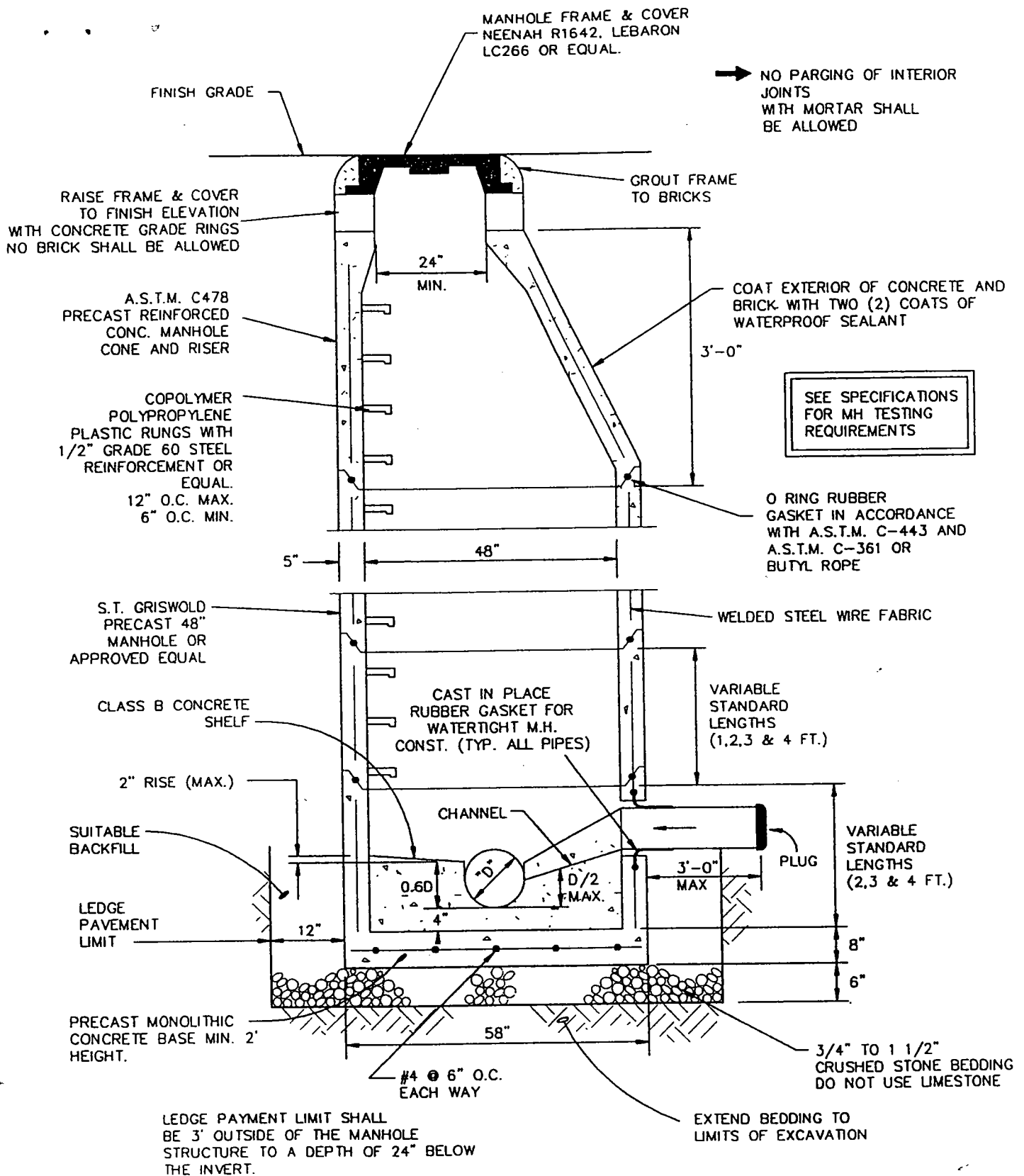
NTS

FIGURE 15



TYPICAL SANITARY TRENCH

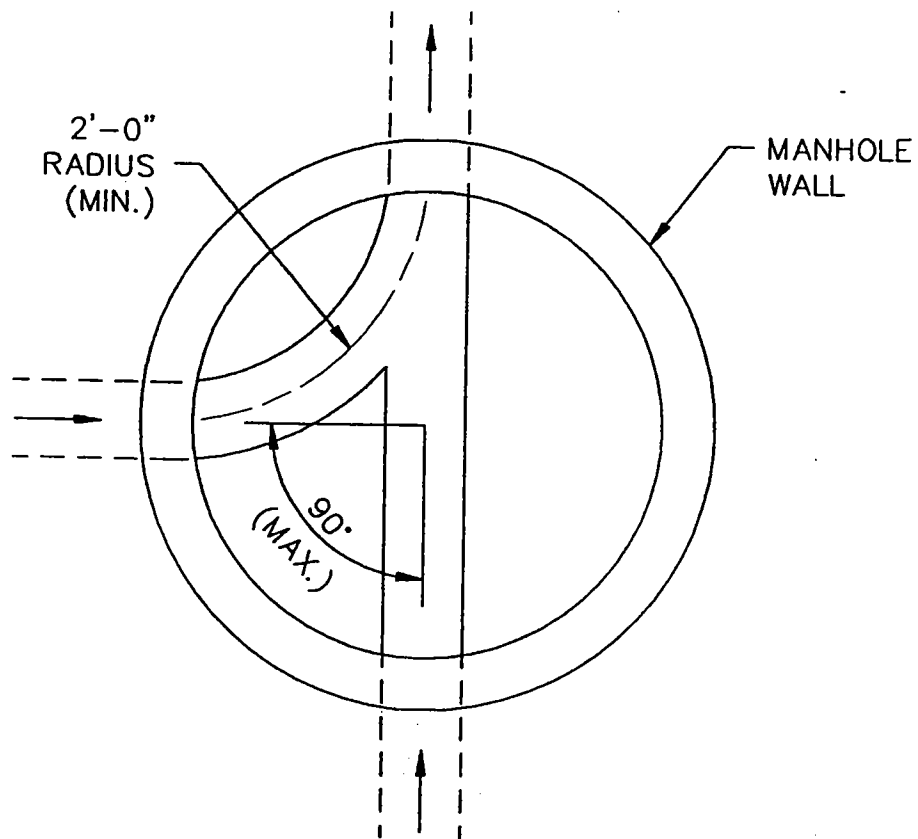
NTS



TYPICAL PRECAST SANITARY MANHOLE

NTS

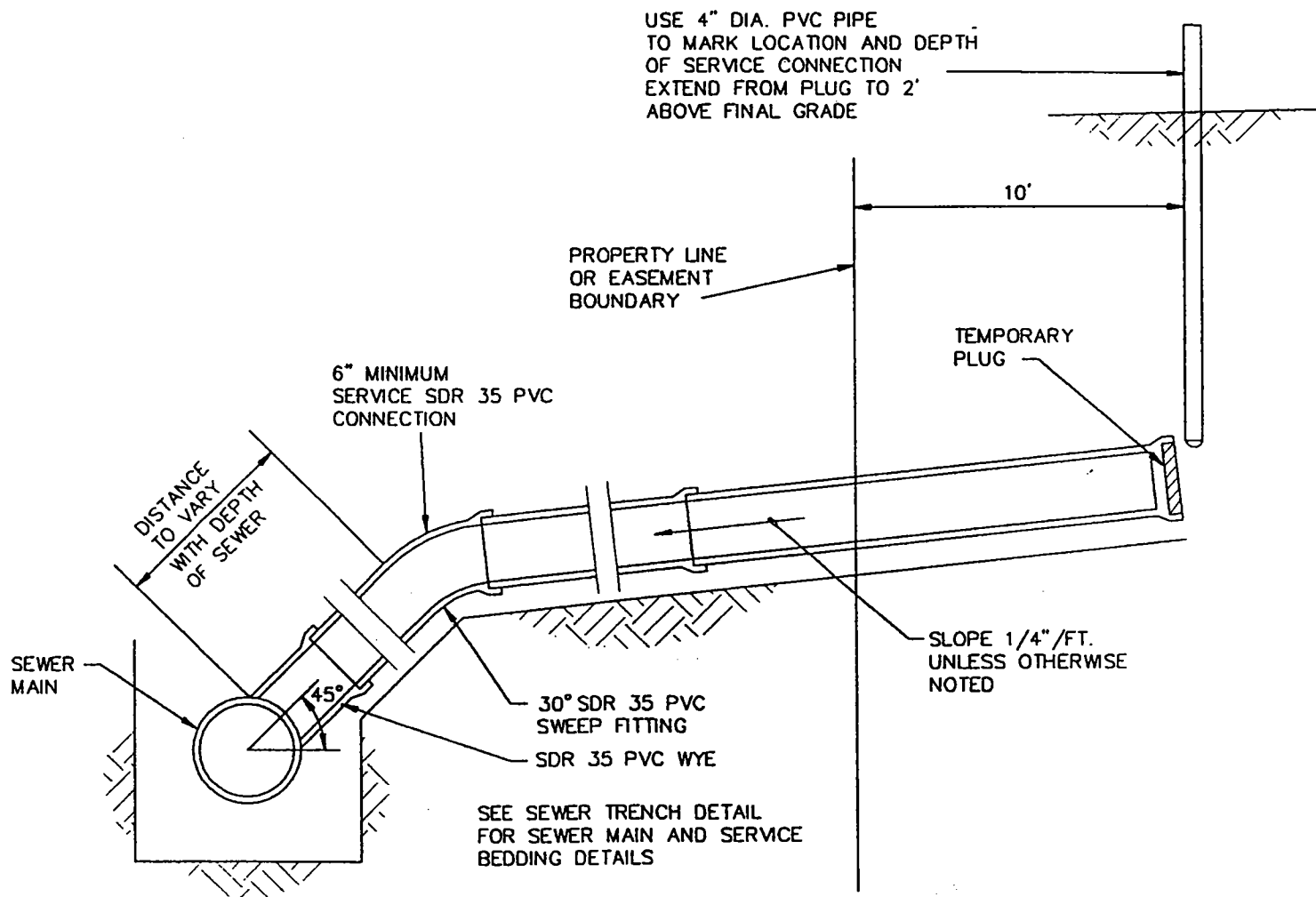
FIGURE 18



MANHOLE CHANNEL

NTS

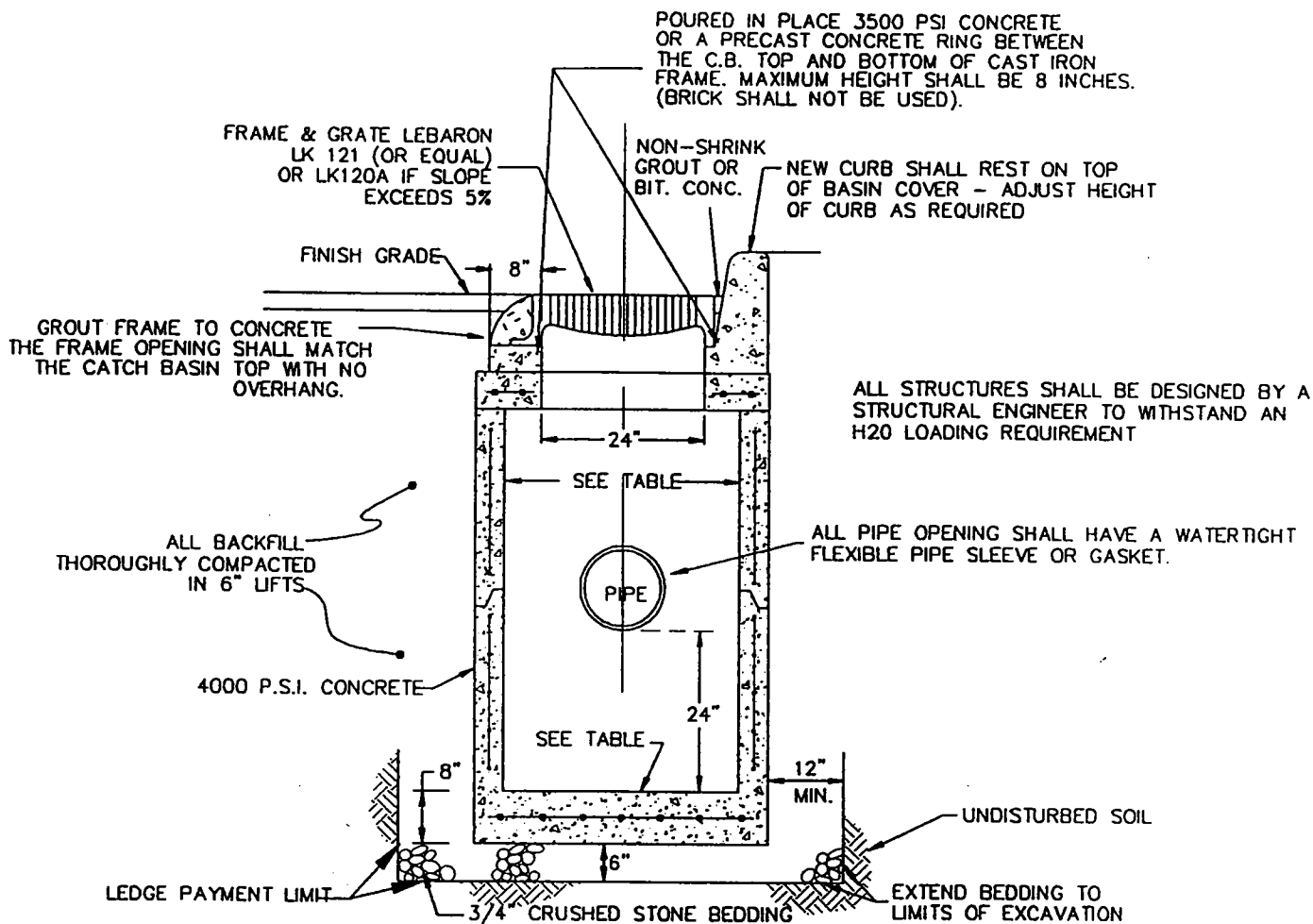
FIGURE 19



SANITARY SEWER SERVICE CONNECTION

NTS

FIGURE 20



PRECAST CATCH BASIN

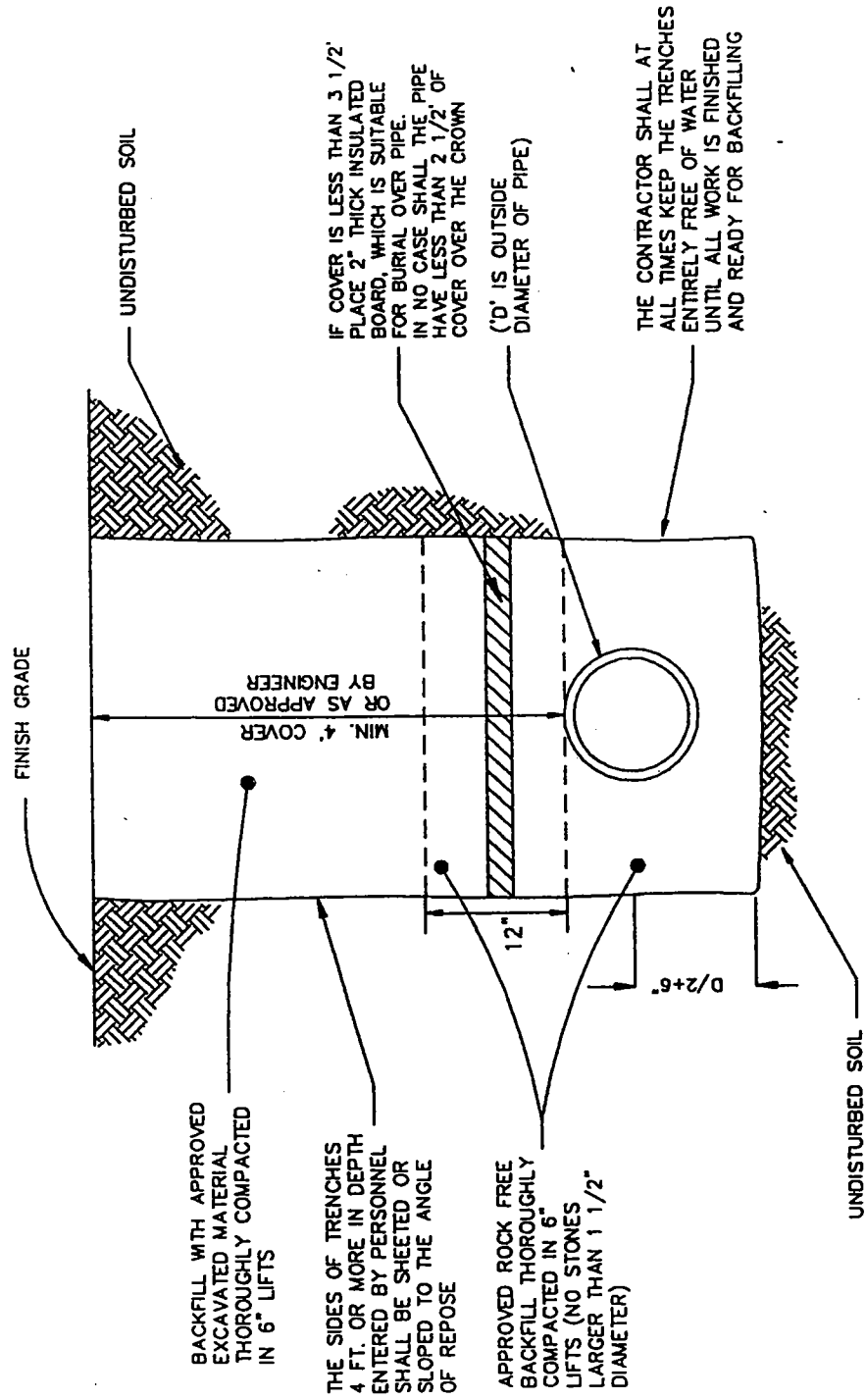
NTS

CATCH BASINS SHALL BE SIZED SUCH THAT:

1. AT ANY ELEVATION, A MINIMUM OF 60% OF THE CIRCUMFERENCE SHALL BE CONCRETE.
2. THE MINIMUM DISTANCE, AS MEASURED ALONG THE CIRCUMFERENCE, BETWEEN TWO OPENINGS SHALL BE 6".
3. THE BASINS SHALL ALSO MEET THE FOLLOWING MINIMUM REQUIREMENTS:

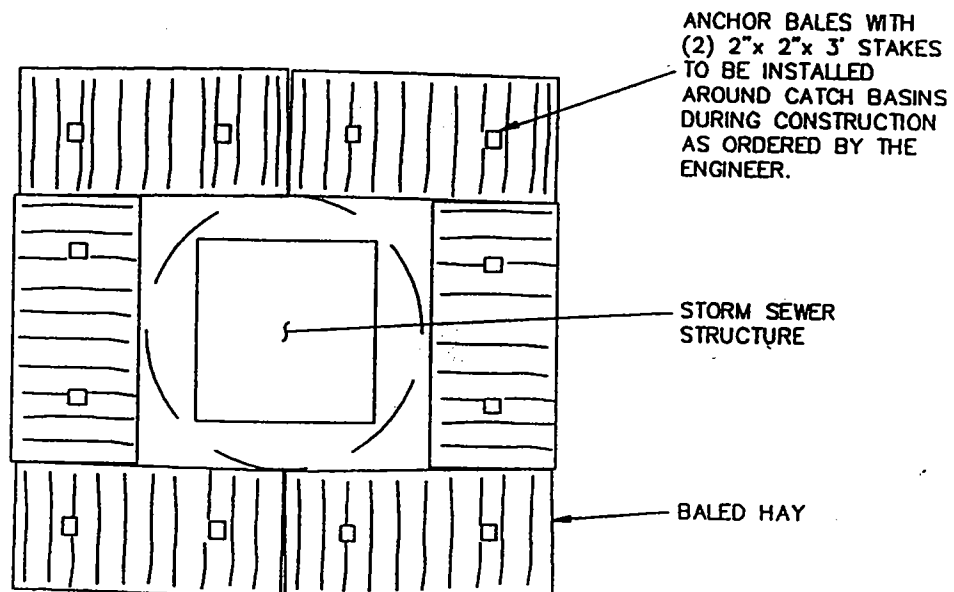
CATCH BASIN DIAMETER	LARGEST PIPE DIA. ALLOWED	SIDEWALL THICKNESS	CONCRETE COVER THICKNESS
36"	18"	4"	6"
48"	30"	5"	10"
60"	36"	6"	12"
72"	48"	7"	18"

FIGURE 21



TYPICAL STORM SEWER TRENCH

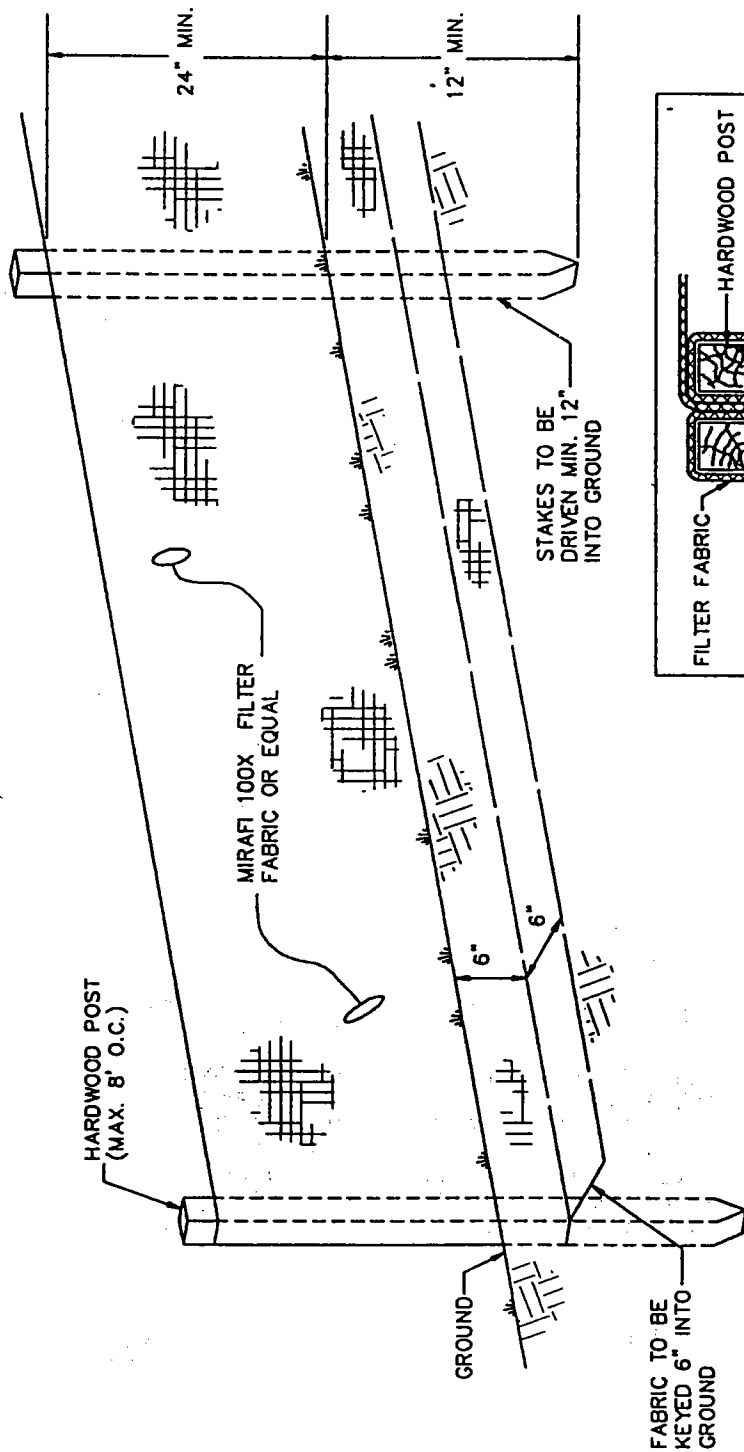
NTS



INLET PROTECTION

NTS

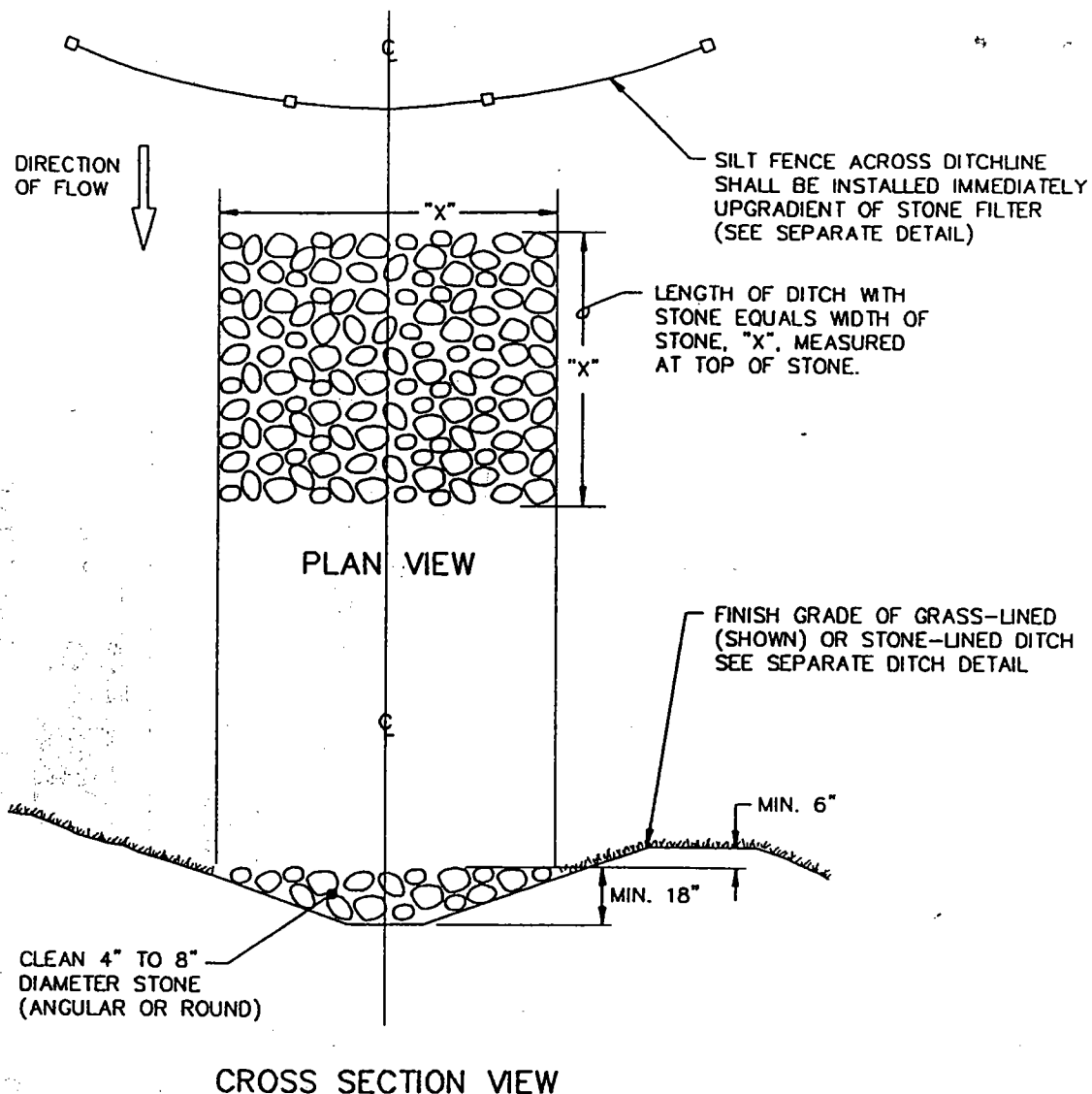
FIGURE 23



NOTE: USE ONLY MANUAL METHODS OF INSTALLATION AND CLEANING WITHIN WETLAND AND BUFFER ZONE.

TEMPORARY SILT FENCE

NTS

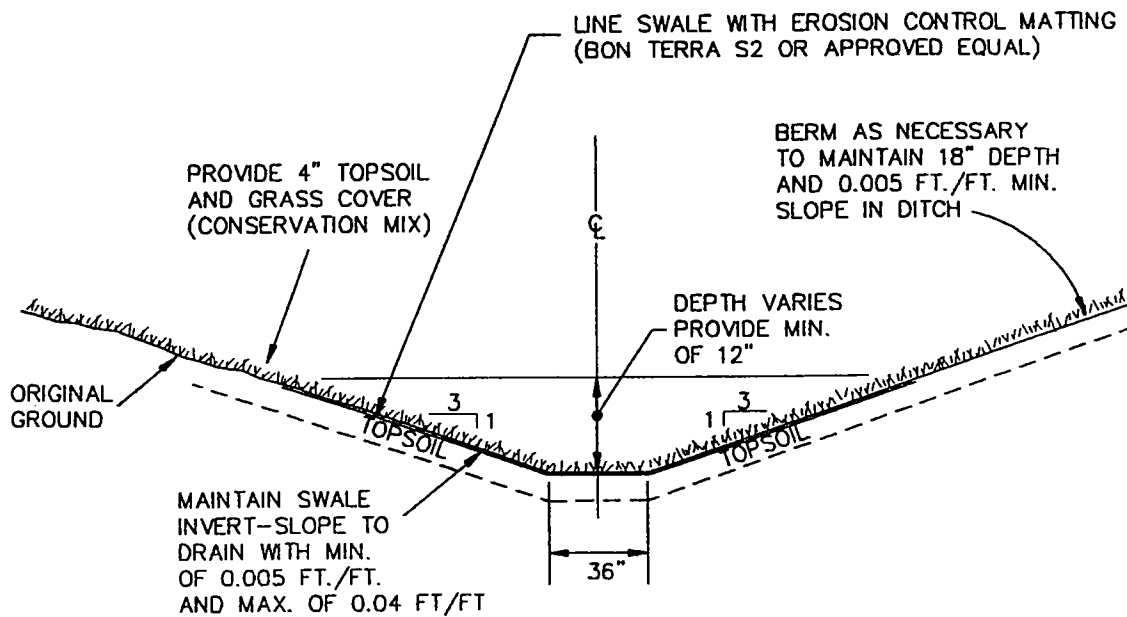


NOTES:

1. STONE FILTERS SHALL BE INSTALLED AT THE LOCATION(S) SHOWN ON THE SITE PLAN.
2. DITCH SHALL BE SEEDED & MULCHED (IF GRASS-LINED) PRIOR TO INSTALLATION OF THE STONE FILTER.
3. THE CONTRACTOR IS RESPONSIBLE FOR PREVENTING CLOGGING/SILTATION OF THE STONE FILTER DURING AND IMMEDIATELY AFTER CONSTRUCTION, UNTIL THE PROJECT'S PERMANENT EROSION CONTROLS ARE IN PLACE (VEGETATION ESTABLISHED, ETC.) AND THE PROJECT HAS BEEN ACCEPTED BY THE OWNER. IF NECESSARY, STONE SHALL BE CLEANED OR REPLACED.

STONE FILTER IN DITCH

NTS



TYPICAL DRAINAGE SWALE

NTS

FIGURE 26

General Classification*	Granular Materials (35 percent or less passing No. 200)						Silt-Clay Materials (more than 35 percent passing No. 200)			
Group Classification	A-1		A-3	A-2			A-4	A-5	A-6	A-7
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6				
Sieve analysis										
percent passing:										
No. 10	50 max									
No. 40	30 max	50 max	51 min							
No. 200	15 max	25 max	10 max	35 max	35 max	35 max	35 max	36 min	36 min	36 min
Characteristics of fraction passing No. 40										
Liquid limit										
Plasticity index	6 max	N.P.**		40 max	41 min	40 max	41 min	40 max	41 min	41 min
Usual types of significant constituent materials	Stone fragments	Fine sand		Silty or clayey and sand			Silty soils		Clayey soils	
General rating as subgrade	Excellent to good						Fair to poor			

* Classification procedure: With required test data in mind, proceed from left to right in chart; correct group will be found by process of elimination. The first group from the left consistent with the test data is the correct classification. The A-7 group is subdivided into A-7-5 or A-7-6 depending on the plastic limit. For PL <30, the classification is A-7-6; PL>30, A-7-5.

** N.P. denotes nonplastic

Figure 4-17 American Association of State Highway and Transportation Officials Soil Classification System (AASHTO Designation M-145).

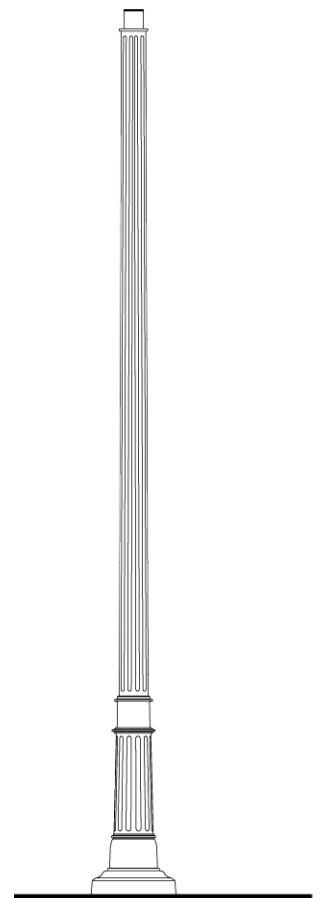
FIGURE 27



Existing Decorative Light
Jericho, Vermont

Manufacturer:	Lumec
Model:	Octagonal Lantern (L70-PCFC-100 MH-SE3-120-SF70-HS-RTAF800F-14-GFI-BKTX)
Lens Finish Option:	Frosted Clear Polycarbonate
Lamp Type:	Metal Halide (100 watt or as appropriate for application)
Reflector:	SE Optics (Asymmetrical) - Hydro-formed cutoff reflector system
Luminaire Option:	House shield (roadways only)
Pole:	14' high pole (16' high luminous center), model RTAF800F*, tapered + fluted decorative aluminum pole
Pole Option:	GFI - duplex receptacle with ground fault interrupter for possible holiday lighting if requested
Finish:	Textured Black (color to be confirmed by Town)

*Note: Pole specification (wall thickness) may need to be modified if banners are to be mounted- to be confirmed by manufacturer. Poles can be ordered with holes drilled and plugged for future banners if requested.



Pole Model RTAF800



Town of Jericho

Lighting Standard: Street Lighting

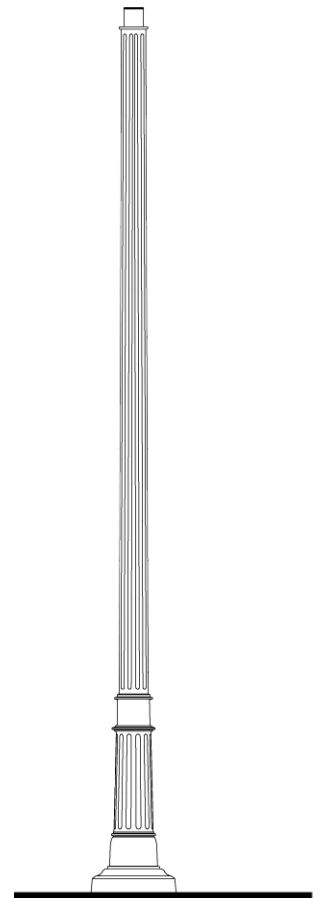
Date: 10.29.08 228 Maple St, MW32
Middlebury, Vermont
802.388.3011
www.landworksvt.com





Manufacturer: Lumec
 Model: Octagonal Lantern
 (L70-PCFC-75 MH-SE3-120-SF70-HS-RTAF800F-10-GFI-BKTX)*
 Lens Finish Option: Frosted Clear Polycarbonate
 Lamp Type: Metal Halide (75 watt max)
 Reflector: SE Optics - Hydro-formed cutoff reflector system
 Luminaire Option: House shield (where glare is an issue)
 Pole: 10' high pole (12' high luminous center), model RTAF800F, tapered
 + fluted decorative aluminum pole
 Pole Option: GFI - duplex receptacle with ground fault interrupter for possible
 holiday lighting if requested
 Finish: Textured Black (color to be confirmed by Town)

*Notes:
 1. Reflector option is dependent on application: For walkway lighting, the asymmetrical pattern (SE3) is suitable, while the symmetrical pattern (SE5) is suitable for general area lighting.
 2. House shield required only where glare is an issue for adjacent residences.



Pole Model RTAF800



Town of Jericho

Lighting Standard: Walkways + Site Lighting

Date: 10.29.08 228 Maple St, MW32
 Middlebury, Vermont
 802.388.3011
www.landworksvt.com





Typical Parking Lot Light - 'Single Assembly'



Typical Parking Lot Light - 'Single Assembly'



Typical Parking Lot Light - 'Twin Assembly'

Manufacturer:	Unspecified
Model:	Unspecified
Style:	Area Light / 'Shoebox' fixture (single or double)
Lamp Type:	Metal Halide (175 - 250 watt max, as appropriate for application)
Reflector:	Full cutoff reflector system
Mounting Height:	20' max.
Finish:	Black (or as approved by Town)

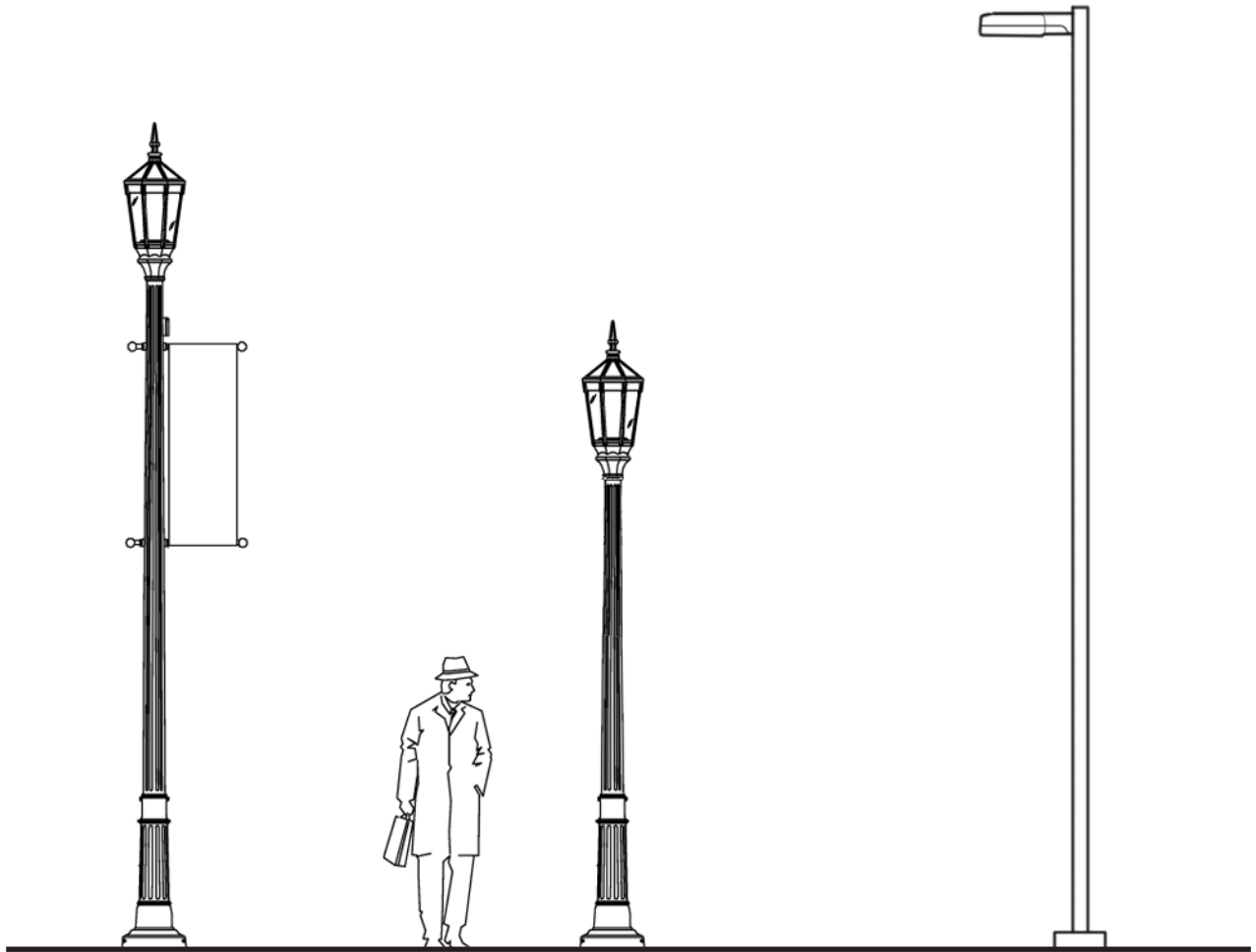


Town of Jericho

Lighting Standard: Larger Defined Parking Facilities

Date: 10.29.08 228 Maple St, MW32
Middlebury, Vermont
802.388.3011
www.landworksvt.com





Street Lighting Standard
Lumec L70 with 14' high pole
16' high luminous center

Walkway / Site Lighting Standard
Lumec L70 with 10' high pole
12' high luminous center

**Larger Defined Parking Facility
Lighting Standard**
Area Light / 'Shoebox' Fixture
20' high luminous center max.

